

# RAILROAD GAZETTE

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## EDITORIAL ANNOUNCEMENTS.

**THE BRITISH AND EASTERN CONTINENTS** edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.

**CONTRIBUTIONS.**—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

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FRIDAY, NOVEMBER 17, 1905.

The first installment of a paper by Chester Arthur Legg, writing for the *Boston Transcript* on the "Sentiment in Favor of Federal Rate Regulation," is printed this week. The paper is eminently fair in its tone and presents the case of those who are in favor of government regulation of railroad rates much better than they have been able to present it themselves. Mr. Legg does not throw any emphasis on rebates, but he shows well the natural advantage which the large shipper has over the small shipper in making his bargains, and in the attention which is paid to him and to his complaints after the bargains are made. He believes that the special advantages accruing to the large shipper merely because he is a large shipper are the real evil of the present situation, and in this we heartily concur. It is unfortunate that Mr. Legg is not so convincing in suggesting a remedy as in stating the facts. He argues that the proper form of control is a series of maximum rates to be promulgated by the Interstate Commerce Commission upon complaint from the shipper or at its own initiative, and says that this is in effect what the present law provides when it allows the Commission to say that a rate is unreasonable, but that by the present plan the reduction may be so gradual that the patience and the means of the shipper are exhausted before he obtains any real relief. Mr. Legg further objects to the criticism that government-made rates would be inflexible, because he says that temporary rates to meet temporary needs could be made as much below the established maximum as might be desirable. Of course, the obvious weakness of this position is that with any system of maximum rates there would be precisely the chance for discrimination that there is at present—neither more nor less. We are forced to say, therefore, that Mr. Legg has suggested a remedy which will not cure. Nevertheless, his analysis of the situation as it exists is well worth reading.

In a brief, but interestingly worked out paper printed this week, Howard R. Bayne discusses the incorporation of labor unions, and he does not consider that it should be made compulsory. He looks on the union as an outgrowth of modern civilization which need neither be feared nor deplored, and his viewpoint is that our legislation should be aimed at developing labor unions along natural and rational lines for their own best and most profitable uses. The violence and crime that have so marred the union cause he considers entirely an excrescence, holding that crime is an individual act; that no union, corporate or incorporate, ever did, or will, tolerate formal rules or by-laws providing for violence in strikes, since, however much individuals favor it or do it, they are not fool-

ish enough to publish it in the rules of their association, and he adds that criminals do not operate that way. Not all readers will agree with Mr. Bayne in the chief conclusion he draws; that public interest will have nothing to gain by enforced incorporation of labor unions. Recent testimony before the New York courts has shown that while unions may not include violence, described as violence, in their by-laws, they nevertheless lay broad duties on their "committees of entertainment," and have a pretty well established scale of rates which the committee pays its assistants for "entertaining" strike breakers. Incorporation of labor unions would not in itself change their manners, but it would provide an organization that could be sued for breach of contract or for damages arising from other causes. Granted that the union must be recognized as a permanent feature of modern industry, then let it assume the dignity and serious character of the companies and corporations with which it deals. In the present status, unions might fairly be grouped with infants and persons of unsound mind as belonging to one of the classes with which contracts are not enforceable. Incorporation would at least make the unions responsible to the limit of their treasures, and it is for this reason that it is so bitterly contested as a compulsory measure whenever it comes up for discussion before any legislative body.

## TO PREVENT TROUBLE AT THE GRAND CENTRAL TERMINAL.

In the preparations now being made for beginning the operation of the Grand Central Terminal in New York by electric power in September of next year, there is a serious menace to public safety and convenience. The menace is that now, only ten months from the time when electric power is expected to be substituted for steam, the New York Central and the New Haven companies are still far from agreement on the kind of locomotives, or motors, or cars to be used for suburban service and to be admitted to the sub-surface level connecting with the subway. On this level, the New York Central proposes that only motor, all-steel cars shall come; but the New Haven claims the right under its agreement to bring in here its locomotives, hauling wooden cars. We do not need to be taught again that fireproof cars are too often essential for preventing loss of life in an electrically operated tunnel. The holocausts in Paris, in the Metropolitan underground, and in England, in the tunnel at Liverpool, should be enough, but we have more evidence, a kind of accident happening often and seen by

many of those who read this: Electric street cars frequently burn up. The passengers are rarely injured because there is plenty of room to get away, and a demand by the public for fireproof cars in such service would perhaps be unreasonable; but in tunnel service the chances for fire are equally good, and when it comes, few indeed can escape. It is a duty to speak of these things now when there is still time, barely time enough, to prevent the making of a dangerous transportation service, rather than to wait for a killing and the storm of public indignation which drives to cover the railroad officers responsible for it.

Mr. George Westinghouse clearly showed these dangers in a letter to this paper nearly four years ago, from which the following is an extract:

"It should be borne in mind that the electric energy required to operate a heavy train is sufficient to melt a considerable bar of iron, or to start a dangerous fire, if anything goes wrong, upon a car of ordinary combustible construction, much more readily than the car stove, the use of which has been abolished by law; therefore, if a collision were to occur between two electrically fitted trains, each having several combustible cars thereof fitted with electrical apparatus and carrying electrical circuits throughout, there could be an accident of so serious a character as to start an agitation having for its purpose the abolition of the use of electricity altogether, or at least to compel the railway companies to abandon the use of combustible cars fitted with electric motors. The destruction by fire of a car or train upon a street or upon a level is one thing, but such an occurrence upon an elevated railway or in a tunnel, can have consequences the contemplation of which should lead to wise regulations governing the construction and use of electrically propelled trains and thereby insure to the public the rapid development of electric traction."

It is not too much to say that Mr. Westinghouse is, more nearly than any one else, final authority on safety in railroad transportation. He has made safe high-speed travel possible, and his few public statements have been like this one—a warning of danger to human life which railroad officers have always heeded. We venture to predict that this one will have the effect intended.

In the correspondence column of this issue appears a letter from the Electrical Engineer of the New York, New Haven & Hartford in reply to an editorial article in the *Railroad Gazette*, October 20, entitled, "A Matter of Standardization." We suggested only the economies and the public convenience to be secured in agreement and harmonious designing by the two companies which operate the same terminal. Mr. Murray shrouds his meaning, making it nearly as difficult as that of a Delphic Oracle, or one of Browning's poems. Nevertheless, we find an indicative sentence: "After six months' careful study of the possible methods of electrification a conclusion has been reached." If this means, and we understand it to mean, that the company really intends to insist on its claimed right to bring lightly-built wooden cars for suburban service in this electric tunnel, there is danger. If it means, and this has been freely said, that New Haven suburban trains hauled by locomotives are to come in the suburban train level, and either occupy the loop, or wait while the locomotives are switched back, then traffic will be delayed and commuters will love the New York, New Haven & Hartford no more than they now do. If it means, and this also has been said, that the New Haven road intends to land its suburban passengers in the express station level, then commuters will have cause for complaint, the express service of both roads will be interfered with and that part of the station will be used for a service not contemplated by the architect and the engineer.

Either company is at liberty to do as it pleases, except on the short piece of track between Woodlawn and 42d street, where they must work in harmony in order to give travelers as quickly as possible safe and convenient transportation to the attractive region where the congested city of New York is expanding. A failure to keep this engagement with the public, either a delay in the approximate time set for opening, or friction and congestion after it is opened, will not be excusable on the ground that the engineers have disagreed.

#### RAILROADS AND THE COAL BUSINESS.

The comparison of the Chesapeake & Ohio and Norfolk & Western in the *Railroad Gazette* of October 27 is the subject of comment in another column by a correspondent. We are glad to have it, since it appears that he, at least, has received a somewhat wrong impression from our remarks about the low grade traffic of those roads. He suggests that on account of the steadiness of the coal traffic, the size of individual shipments, and the saving in expenses of handling over higher grade freight, the margin of profit on carrying coal is really not so very narrow, and that therefore money spent by these companies in extending their coal traffic is,

from the standpoint of the stockholders, money well invested. With this conclusion we agree, as well as with much of the reasoning which leads up to it. Yet in spite of the fact that merchandise freight, for instance, has to be loaded and unloaded by hand, that it requires freight houses, involves much billing and other clerical labor, and furnishes most of the material for the claim department's activities, it is in general true that the extra rate received more than compensates for the extra expense, and that it is a railroad's most profitable traffic. Conversely, in spite of the fact that the expenses just enumerated are almost entirely saved on coal shipments, we cannot admit that the Chesapeake & Ohio and the Norfolk & Western received a wonderfully large unit margin of profit on their coal business. It is self-evident that they received more than enough to pay operating expenses. Since coal and coke furnished over 60 per cent. of their total tonnage, this traffic must also have paid a large share of the fixed charges and something towards dividends. Nevertheless, the unit rate of profit was small and to obtain it skillful management was necessary.

There was, however, in the review of the two Virginia coal carriers, no intention of suggesting that the size of their coal business was approaching or had reached the limit of profit. It is, of course, a general rule of railroad operation that increased tonnage is increasingly profitable. The more freight a railroad carries at regular rates the greater will be the profits, and these, once fixed charges have been earned, in steadily increasing proportions. Every additional ton of freight raises the average profits on each of the total tons carried. In other words, the more use that can be got out of the roadbed, once the interest on its cost has been paid, as the *Railroad Gazette* has often said in an entirely different connection, in regard to the profitableness of installing block signals, the more proportionately profitable becomes the operation of the railroad.

It should, then, be fair to assume, in view of the business ability of their managers, that the Chesapeake & Ohio and Norfolk & Western are extending their coal traffic as fast as opportunity offers. Is this the case, or is there some justification for our correspondent's opposite implication?

At the present moment there is a tremendous car shortage throughout the country, particularly on the Eastern coal roads. The *Coal Trade Journal* recently estimated that the Philadelphia & Reading is supplying about 65 per cent. of the cars required for freight; the Pennsylvania about 50 per cent., and the Baltimore & Ohio, for coal shipments, about 15 per cent. Also, that in the West Virginia districts, because of lack of cars, one-third time is the best the operators can expect. Figures recently published by a committee of operators in the New River and Kanawha districts of West Virginia, the former largely and the latter entirely dependent upon the Chesapeake & Ohio for transportation facilities, go to corroborate this last statement. In brief, they show that in 1903 the Chesapeake & Ohio handled only 46 per cent. of the coal tonnage available on its line in those districts; in 1904 only 40 per cent., and in 1905 only 36 per cent. This is figured on the basis of 24 working days a month. The number of tons loaded each month during the nearly three years is divided by the daily capacity of the mines, the resultant quotient being the number of theoretical full days each month that the mines were in operation. This does not mean, of course, that the mines were actually closed down on an average of 13 days in 1903, 14 days in 1904, and 15 days in 1905, out of every 24, but that there were only that many days' full operation on the basis of the mines' total capacity.

If it could be shown that one-third time in these districts was only a temporary condition, due to the season's car shortage, the most that could be said would be that the railroad management had misjudged the probable growth of traffic, but when cars are shown to have been lacking month by month through a period of years, it is evident that the Chesapeake & Ohio, at least, is not attempting to provide for anything like all the coal tonnage offered. Here in one small portion of its territory have been thousands of tons of coal available for shipment, on each of which the railroad's profits would have been greater than on the average of the tons which it did haul; yet the company has been carrying less than one-half of the tonnage offered in these districts, and the proportion of available business left untouched seems to have grown larger year by year. Shall we say that the road is not so wisely managed after all?

Were all the soft coal in the United States in West Virginia this might well be said, but the general situation must here be taken into account. It would undoubtedly be very much to the advantage of the Chesapeake & Ohio to greatly enlarge its coal business, as it would be to the advantage of any individual road; but,



while it would be a good thing for an individual road, if every soft coal road should do it, the market would soon be flooded with an over-supply of soft coal, prices would drop sharply, mine operators' profits would correspondingly fall off (many railroads operate their own mines), shipments would be reduced, and the railroads as carriers would suffer. This is because there is more soft coal available than the country will pay a profitable price for consuming. The situation is like an agreement between manufacturers to maintain a fixed price on a given product. It is to the advantage of any one of the manufacturers to under-cut the established rate and sell a great many more goods; but if any one manufacturer does it, the others will soon follow suit, and the bottom will be knocked out of the market. Agreements of this sort have usually been failures for this very reason, just as for years prices were utterly demoralized in the soft coal industry. In the same way that prices can be maintained when individual manufacturers are absorbed into a trust, the more stable condition of to-day is the result of concentration of ownership. The Pennsylvania and the New York Central control directly or indirectly most of the soft coal in the East, and it is therefore possible for production to be limited to the demands of the whole business. This naturally meets with strenuous opposition from the less favored operators, who see their individual business almost ruined in order to keep the general situation well in hand. In the West Virginia districts referred to, for instance, their protests are very bitter against the Chesapeake & Ohio's policy of spending money which might have gone to provide more cars, locomotives, and trackage and terminal facilities, in building numerous extensions into new coal districts. These, in their view, are being taken possession of, not to be developed, but simply to be protected from unfriendly interests, and in consequence, condemned to "inadequate service for an indefinite length of time.

These coal operators undoubtedly have a grievance, but it seems very doubtful whether there is any relief from the situation which troubles them. So long as consumers are satisfied, and the bituminous community of interest does not use its power to raise prices unduly, it is hard to see how there can be much change from present conditions. Even the building of independent lines, like the Tidewater Railway which is already under way, paralleling the Norfolk & Western from the eastern end, with Lake Erie as its possible goal, can hardly result in any permanent relief, for the chances are too strong in such a case, at least if past experience is a guide, that the present powers will turn up in control.

There is no question, as our correspondent says, that both the Chesapeake & Ohio and the Norfolk & Western are "splendid business propositions"—both their histories prove that conclusively. Their present prosperity is especially due to the great demand for bituminous coal, which has continued ever since the anthracite strike forced many to abandon, as it has turned out, permanently, the use of the more expensive variety. As long as their coal is in such strong demand and their present improvement policy is carried on, the two properties cannot fail to be increasingly profitable.

#### MOTOR DRIVE FOR RAILROAD SHOP TOOLS.

Electricity has had a great influence on the general design and efficiency of the most modern railroad shops, besides increasing the efficiency of some of the older shops in which it has been introduced. The advantages to be gained by its use as a motive power are many. Among the most important is convenience of shop arrangement, by reason of the elimination of line shafts; lighter shop construction; a clear headway for cranes; the driving of machine tools directly by motors, and the ease of manipulation and finer increments of speed resulting therefrom; a lighter shop, and a saving in power.

It is undoubtedly true that a saving in power is gained by the elimination of line shafting. Mr. Herbert T. Condict, in a paper read before the National Machine Tool Builders' Association, said: "With the belt drive it has been practically demonstrated that the average loss in shafting and belting amounted to at least 50 per cent. of the total power developed by the engine." This is especially caused by the fact that when a belt is laced it is made as tight as possible, in order to provide for stretching, and this results in loss of power through friction in the bearings as well as in the running of the belt itself. After the belts have run for some time they become loose, and there is a loss of power from slipping. In the case of the line shafting itself, no matter how carefully the line may be put up in the first place, there will in a short time be a certain amount of distortion, especially

in a long and heavy shaft, which in time will cause a great loss in the shafting bearings, no matter how well they are lubricated. In electrical transmission, assuming that the shop is to be operated at 75 per cent. of the generator capacity, so that a good efficiency can be obtained from the generator itself, the loss between the engine shaft and the line will be about 6 per cent., and the line loss 2 per cent., an average loss in the motor itself of about 17 per cent., and a loss between the motor shaft and the shaft of the tool itself (when a single pair of gears or a chain is used), of 5 per cent., or a total loss between the engine shaft and the tool shaft of about 28 per cent. With the belt drive the power lost in the shafting and belting is practically a constant loss, no matter whether the shop is operated at its full capacity or not, while the loss in the case of electrical transmission varies practically directly with the power used.

Saving in power is often mentioned as the chief advantage of electric drive over the old method of driving by line shafting, but as the cost of power is but a small item, rarely exceeding 5 per cent. of the total cost of operation, this one saving must be considered a comparatively unimportant matter. Probably the greatest advantage derived from electricity as a motive power is in the saving of time which results from its use. Labor cost, particularly in a railroad shop, is the chief item of expense. Many claim that the saving in time and labor due to the introduction of electric crane service alone will frequently warrant the use of electricity in shops. The adoption of motor driven machine tools and an intelligent use of the fine increments of spindle speeds made possible by their use will also add greatly to a shop's efficiency. Figures showing the saving due to the adoption of electric drive in railroad shops are not as yet available. A record extending over a period of five years in one of our largest industrial shops, however, shows an actual saving of 30 per cent. in labor cost due to the adoption of modern motor driven machine tools and an intelligent use of cutting speeds. It is generally conceded by the most conservative railroad mechanical officers that even if electric power is not at first installed, new shops should be designed with electric drive in view.

The statement is frequently made that the best results can be obtained by individually driven tools. More conservative practice, however, holds that this is going a trifle too far, inasmuch as the results so far obtained from the group system of driving the smaller tools have been most satisfactory. Undoubtedly it is true that the heavier tools, which require from 10 h.p. to 25 h.p., and tools remote from the main shop, can be served best by independent motors. It is practically impossible to lay down any general rule as to where group drive should cease and when individual driving should begin, as each shop presents a different problem. From a series of tests, the details of which were printed in the *Railroad Gazette* of February 13, 1903, made at the Du Bois shops of the Buffalo, Rochester & Pittsburgh, to determine the power required to drive machine tools, it was shown that the horsepower of motors used in group drive was from 2 to 2½ times smaller than the total horse-power which would have been required if each tool in the group had had its own individual motor. The results of this test raised the question as to how far the low average power taken by large groups of tools in operation may be due to the flywheel action of the shafts and pulleys. The desirability of being able to run one or more tools while the rest of the shop is idle is another feature of motor drive upon which great stress has been laid. This is, of course, a good feature, but it is perhaps less important than it seems at first glance, for it must always be remembered that power is one of the cheapest of shop commodities. In large, isolated machines, which are only used occasionally and which require motors of from 15 h.p. to 25 h.p., it is probably safe to say that there is no money saving over belt drive when the cost of the motor and its maintenance is taken into account.

In shops where these large machines are absolutely necessary, but are not in constant use, a suggestion which seems practical for reducing the capital outlay for motors is to have each of the large machines fitted with a specially designed motor base, and with the same size driving gears. Then, instead of having a permanent motor attached to each machine, one or even two large motors may be fitted with bases and driving pinions to fit into the special motor bases and driving gears of the large machine tools. This would make the large motors interchangeable with all of the larger machines. The cost of shifting the large motors to the different tools, as occasion required, and of making the electrical connections, would be trifling as compared to the interest on the capital invested in the much larger number of large motors necessary with

permanent individual drive. With a little planning the work which these machines are called upon to do could be arranged so that not more than two of the heavier tools need be operated at the same time.

As to the relative first cost of line shaft and motor drive, it is almost impossible to arrive at exact figures, but it is generally conceded that the first cost of shafting, belts, countershafts and hangers offsets, or more than offsets, the first cost of motors, wiring and other equipment required for electrical transmission. A considerable saving can also be made in the initial cost of the power house when electric drive is used, as there is less loss in transmission of the power between the engine shaft and the tool, and therefore a smaller power plant is required. In regard to the relative cost of maintenance of the two systems, it has been clearly shown in many cases that the cost of maintaining electric drive is considerably below that of belt drive.

An editorial in our last week's issue said that about 90 per cent. of the cost of maintenance of equipment can be charged directly to repairs of cars and locomotives. Assuming that half the cost of those repairs is not affected by improvements in shop methods or tools, we have about 11 per cent. of the operating expenses on which to effect a possible saving by putting into use modern shop tools and facilities. It is a conservative estimate to say that a modern railroad shop with electric cranes, individual motor driven machines using high-speed steel tools and good shop management will show a saving of 25 per cent. over an old shop of similar size and capacity. That is to say, nearly 3 per cent. of the whole operating expenses may be saved. Thus it is quite apparent that adoption of modern shop methods is bound to pay a big return on the investment.

#### A Very Fast Run.

In a run made by a special train from Crestline, Ohio, to Clarke Junction, Ind., on October 24, over the Pittsburg, Fort Wayne & Chicago, a speed of 74.55 miles an hour was made for 257.4 miles, which gives to the Pennsylvania Lines decidedly the best record ever made for so great a distance. The train which made this run was a special of four cars carrying a party of railroad officers to the Chicago meeting of the American Railway Association. The weight of the cars was 520,000 lbs. The engine was one of the company's standard Atlantic type, weighing 176,600 lbs., and, with tender, 320,400 lbs., making a total for the engine and train of about 420 tons. An officer of the road, who sends this record, says that no particular attempt was made to break records, but simply to have a "comfortable" ride to Chicago.

The details of the run are as follows:

		Time used, min., sec.	Miles traveled.	Rate, miles per hr.
Crestline.....Dep.	11:05:00 a. m.			
Fort Wayne.....Arr.	12:46:20 p. m.	101:20	131.4	77.81
Fort Wayne.....Dep.	12:49:40 p. m.			
Clarke Junction.....Passed.	2:32:10 p. m.	102:30	126.0	73.75
Stop at Fort Wayne.....		3:20		
Time, distance and rate through.....		207:20	257.4	74.55

The previous records most nearly approaching this are those reported in the *Railroad Gazette* of June 30 and August 11 last. On the latter date we published a record of 66.18 miles an hour for 300 miles, which was made by a regular train over the same road as that which figures in the present report; we also noted records of 200 miles at 71.3 miles an hour, 100 miles at 77.2 miles an hour, and 50 miles at 79 miles an hour. The special train over the Lake Shore & Michigan Southern on June 13 ran 182 miles at 73.2 miles an hour; weight of the three cars in the train, 175 tons.

It will be observed that in the run now reported no stop was made at Clarke Junction. If a stop had been made here, adding, say, 1½ minutes to the time, the average speed from Crestline would have been almost exactly 74 miles an hour.

The principal dimensions of the Pennsylvania standard Atlantic type engines are:

Cylinders.....	20½x26 in.
Total weight.....	176,600 lbs.
Weight on drivers.....	109,000 lbs.
Heating surface, (firebox, 166); total.....	2,640 sq. ft.
Grate area.....	55.5 sq. ft.
Diameter of drivers.....	80 ins.
Tubes: No. 315; diameter.....	2 ins.; length.....
Fuel.....	Bituminous coal.

Besides making no particular attempt to break records the officer before mentioned gave instructions after passing Fort Wayne, to "check the speed." How fully the engineman carried out these instructions we leave the reader to conjecture. The officer in question may perhaps be one who has seen service in the traffic department, where, in ancient times, orders (to refrain from rate cutting) always sounded well but sometimes failed of execution. Or, possibly the order to "check" was not addressed to the engineman but to the men who sat in the observation car and watched the mile posts.

#### Long Island Railroad.

The report now at hand covers two periods, one for the six months ending Dec. 31, 1904, and the other for the year ending the same day, owing to the change of the fiscal year to make the company uniform in its reports with the other Pennsylvania properties. We have often pointed out in these columns the peculiar situation of the Long Island. Its chief revenue is from passengers, but at present, owing to the imperfect connections with New York City, it only handles its really profitable traffic through a quite short season. The freight traffic of the road is secondary and it is expensive to operate because it must of necessity move in small train loads to diverse localities. From a freight standpoint the Long Island has the characteristics of a switching line rather than of a trunk line. The obvious conclusion to be drawn from these circumstances is that the Long Island cannot work along successfully by the exercise of ordinary, or even of extraordinary, economies. It must spend money in order to get money, and it must spend a lot of it. In the interval between the present rather chaotic state of the property and the completion of the East river tunnels and of the electrification of the New York district the road must just do the best it can, having for its chief consolation the Pennsylvania's guarantee on its bonds.

The present report, owing to the difference in the period of time covered, cannot be compared satisfactorily with that of the preceding year. The supplementary and general income account for the six months ending December 31, however, is compared with the same period last year, and the showing made, in view of the facts previously mentioned, is a good one. Gross earnings increased substantially, operating expenses increased very little, and net income, after computing the increments from interest on investments, ferry operation, etc., and deductions on account of interest on bonded debt, taxes, etc., amounted to \$299,649 as against \$96,646 for the same six months in 1903. The best gain was that derived from freight traffic, which earned \$1,103,265, an increase of \$126,958. Passenger traffic brought in \$2,363,815, exclusive of express and mails, and the increase here amounted to \$86,117. The report does not state what portion of this is due to new business and what portion to the increases in fares, which were made last spring and were quite substantial on some of the branches, particularly on the Oyster Bay division, but by making the unsatisfactory comparison between the entire year ended June 30, 1904 and the entire year ended Dec. 31, 1904, a good increase in the number of passengers is indicated, while the average passenger mile earnings over the entire line actually decreased from 1.44 to 1.435.

As we said in our review last year, the Long Island's expense account is affected quite unfavorably by two rather unusual things. Since Long Island City and Brooklyn were included within the limits and ordinances of greater New York the company has been obliged to use anthracite coal for a tremendous amount of traffic that could previously be hauled with engines burning bituminous. In the year ending June 30, 1902, with 4,011,609 revenue train miles, passenger and freight, coal cost the company \$531,726, while in the year ending Dec. 31, 1904, with 4,189,049 train miles, coal cost \$844,596. That is to say, coal cost, without material difference in the circumstances of the traffic, and with no let-up in operating efficiency, rose from 13 to 20 cents per revenue train mile, with no relief in sight prior to electrification. The other unusual expense which the Long Island has been forced to shoulder within the past few years is the car mileage balance, which rose from \$17,952, in 1902, to \$214,787, in 1904, as a result of the per diem rule. During Mr. Baldwin's illness, when Mr. Potter was in active control of the road, he made active efforts to have the Long Island considered as a switching road, so far as the car mileage was affected, but this has not yet been brought about.

In order to finance the elimination of grade crossings, the electrification of part of the system, and large outlay for double track, yards and other facilities, required by the through traffic to be exchanged between the Long Island and the Pennsylvania and New Haven road, the creation of a 4 per cent. refunding mortgage was authorized last year, to the extent of \$45,000,000, of which \$26,605,000 was reserved for all underlying liens. Of the remainder, \$10,000,000 of bonds, guaranteed by the Pennsylvania Railroad, were issued last year. The report at hand shows an additional issue of \$2,200,000 4 per cent. bonds due in 1949, with which a like amount of former bonds under several mortgages have been retired. During the 18 months covered by the full term of the report at hand, there has been a total increase in the capital account of \$360,665, the largest single item of which was payable on account of the passenger terminal at Long Island City. It is noteworthy that even during these years of deficit, earnings increased enough to considerably more than offset the increase in fixed charges.

Looking more in detail at the operation of the road throughout 1904 it will be seen that the freight traffic shows important increases under two heads, coal and merchandise. As compared



with the year ending June 30, 1903, coal traffic for the year ending Dec. 31, 1904, increased from 571,046 tons to 680,585 tons, while merchandise increased from 249,673 tons to 429,400 tons. These respective increases, one tending to a larger and one to a smaller train load, apparently just about balance each other, as the average train load for the year was 127 tons, compared with 129 tons in 1903. This extremely small loading does not indicate any inefficiency in operation, but shows the peculiar branch line and express goods character of the traffic. In fact, in its traffic problems the Long Island is perhaps more analogous to an English railway than is any other line in this country.

The statistics which follow are for the six months ending with Dec. 31, 1904 and 1903, respectively:

	Six months ending Dec. 31.—	
	1904.	1903.
Mileage worked .....	392	392
Freight earnings .....	\$1,103,265	\$976,397
Passenger earnings .....	2,363,815	2,277,698
Express traffic .....	579,781	528,173
Gross earnings .....	4,118,817	3,870,858
Maint. way and structure .....	341,233	465,515
Maint. of equipment .....	350,233	362,128
Cond. transportatn—traffic .....	65,253	1,963,945
Cond. transp.—operation .....	2,053,052	2,878,339
Operating expenses .....	2,928,630	845,629
Net earnings, excluding taxes .....	1,040,495	929,652
Gross income .....	1,302,689	96,646
Net income .....	299,649	275,295
Deficit .....	54,390*	

\*Year ending Dec. 31, 1904.

†Year ending June 30, 1904.

### TRADE CATALOGUES.

**Mechanical Draft.**—Bulletin No. 75, entitled "Mechanical Draft: What it is, what it does," has just been issued by the B. F. Sturtevant Co., Boston, Mass. This booklet not only briefly presents the salient features of this system of draft production, but illustrates a variety of plants which clearly show "what it is." The suggested query in the words "what it does" is answered thus: It does what an ordinary chimney is incapable of doing. Its cost is from 20 to 40 per cent. of that of a chimney; its intensity permits of the burning of finely divided or low grade fuel; it makes possible the utilization of the heat of the flue gases which a chimney wastes in producing draft; it is independent of the weather; is automatically regulated to maintain constant steam pressure, decreases smoke, increases the capacity of an existing plant, and serves as an auxiliary to a chimney already overburdened; saves space and is portable.

**Portable Electric Hoists.**—Illustrations, price lists, weights and general dimensions of portable electric hoists made by the Yale & Towne Mfg. Co., New York, are given in its new "Electric Hoist" catalogue. The distinctive features of this type of hoist are its steel construction and portability. It can be shifted from place to place like a chain block and used wherever current is available as it is almost as easily wired as an incandescent lamp. The two-ton, four-ton and six-ton hoists can be procured from the makers at once, as they are always kept in stock.

**Underfeed Stokers.**—The Underfeed Stoker Co. of America, Chicago, publishes a "Publicity Magazine" devoted to the interests of the Jones stoker. The November number, with 16 pages, contains various sorts of information in line with the interests served by the magazine. This company's catalogue, which is put out in folder form as a pocket edition, fully illustrates and describes the device and shows various applications to different sorts of boilers and boiler plants, as well as showing the advantages of the device and of the principle it embodies.

**Heating Apparatus.**—Sectional catalogue No. 186 of the American Blower Co., Detroit, Mich., is devoted to heating apparatus. The construction of the "A B C" heater is illustrated and described, information regarding capacity is given, and price lists for arriving at the cost of any size heater. Illustrations of a number of possible combinations of heaters and fans are shown. The last few pages give brief information about the "A B C" system of mechanical draft.

**Tool Steel.**—Wm. Jessop & Sons, Ltd., New York, sends its new catalogue and price list of the Jessop's high grade tool steel. The first few pages are devoted to an interesting discussion in which the advantages of using high grade tool steel are set forth. This is followed by instruction for the hardening and tempering of the Jessop's tool and die steel as well as the Jessop's "Ark" high-speed steel which is specially recommended for use in connection with modern machine tools.

**Railroad Supplies.**—Fairbanks, Morse & Co., Chicago, have issued 1906 catalogue No. 52A, devoted to the supplies of their railroad department. It is a 6 x 9 cloth-bound volume of 430 pages, and covers in complete shape the large line of railroad supplies carried

in this department. The illustrations, which are numerous, are mostly half-tones, and the typographical work is excellent. There is a complete index at the back of the book.

**Mail Pouch Catcher.**—The Barker Mail Crane Co., Clinton, Iowa, is distributing folders, printed in two colors, describing its new mail pouch catcher which is placed below the car door to enable shorter mail cranes to be used. This catcher was described in the *Railroad Gazette*, April 21, 1905. An improvement has been made since that time by substituting a gear for the cable between handle and catcher.

**Railroad Specialties.**—A two-leaf cardboard folder entitled "A Signal Advantage," which is a clever little advertising device, is being distributed by the Buda Foundry & Mfg. Co., Chicago. Inside is a signal post and movable semaphore, so arranged that as the folder is opened the semaphore is drawn to danger. The printed matter enumerates some of the lines carried by this company.

**The Chicago & North-Western** has prepared a handsome booklet to describe its new "North-Western Limited" trains between Chicago, St. Paul and Minneapolis. The printing is in green and black and each page is embellished with one or more artistic pen and ink drawings illustrating the car interiors or features along the line.

**Hydraulic Accumulators.**—The Watson-Stillman Co., New York, describes and illustrates a variety of types of accumulators and valves which are specially designed for use with accumulators in its new "Hydraulic Accumulator" catalogue No. 67. General information of interest to hydraulic engineers is also included.

**Machine Tools.**—The November issue of the *Progress Reporter* issued by the Niles-Bement-Pond Co., New York, shows a number of interesting machine tools. Special stress seems to be given to the Niles electric hoists and electric traveling trolleys. Three full-page illustrations showing these machines in use are given.

**Electric Car Lighting.**—The advantages and operation of the Consolidated "Axle Light" system of electric lights and fans for railroad cars is described and illustrated in detail in Bulletins Nos. 1 and 2 issued by the Consolidated Railway Electric Lighting & Equipment Co., New York.

**Hydro-Electric Plants.**—A complete description of the hydro-electric plant of the Spring River Power Co., Joplin, Mo., is given in a Bulletin issued by The Arnold Company, Chicago, who designed and constructed the entire plant, including the transmission lines and sub-stations.

## CONTRIBUTIONS

### Railroads and the Coal Business.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am interested in your recent article on the Norfolk & Western and Chesapeake & Ohio Railways. You lay special emphasis upon the low rate of freight, but is the transportation of coal such an extremely "close" proposition as your comment indicates? Ordinary freight has to be loaded and unloaded by hand, freight houses provided for its receipt and storage, and multitudes of bills have to be made out for small shippers; whereas coal shipments on the two roads mentioned are made in large blocks, a train-load a day by some shippers, and there is no expense incurred by the railroads for loading or unloading.

It seems to the writer that the two roads named are splendid business propositions, and that any money spent by them in the further exploitation of their business, the providing of more cars, locomotives and trackage facilities, with a view to getting more of the freight which you characterize as such a low-price tonnage, will be greatly to the advantage of those interested in the ownership of the companies.

F. W. SAWARD.

### Indian Minimum Rates.

Calcutta, Aug. 31, 1905.

TO THE EDITOR OF THE RAILROAD GAZETTE:

With reference to my paper on Indian Slow Freight Rates, printed in the *Railroad Gazette*, July 28, 1905, and to your editorial note on the same subject: The position we are trying to get recognized is that in the case of railroads owned by the one proprietor—that is, in this country, the Government—those working at low rates of cost per ton mile shall be permitted to charge lower rates for carriage than those working at a comparatively high cost per ton mile.

If the cheap working line must keep up its rates to the level

of reasonable rates, having regard to the cost of working on its less fortunate neighbors, it will be charging rates higher than it can afford to charge, and in the case of long distance traffic will prevent the cheaper range of commodities from being tendered for carriage by rail. If on the other hand, the line expensive to work goes down to what the cheap line can afford, it will be carrying at a loss. As between Calcutta and Bombay, the sea freight at the Bombay port is much lower than to and from Calcutta, and we might, following the American practice, ask for a differential in favor of Calcutta such as has been given to Boston and Philadelphia. We, however, merely ask that as Bombay is allowed and does make full use of its advantage in cheap sea freight, Calcutta should be allowed by means of low charges for land carriage to profit by the low cost of rail transportation on this side of India.

W. A. DRING,  
Chief Traffic Manager, East Indian Ry.

#### The New Haven Road and the New York Terminal Electrification.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Concerning the proposed method of electrification it is interesting to note the unsolicited general concordance of opinion on the part of certain engineers and gratifying in the main to note a temerity in expressing a concrete opinion of our decision.

Without a full appreciation of the relevant factors in the case one could hardly view with a more kindly eye a hearty endorsement of our conclusion than a condemnation of it. Certainly the first indication of a real engineer is his reservation of an opinion until all these relevant factors have, in the full knowledge of their true bearing, been assembled. To-day a conclusion is worth nothing that is not a compromise. A compromise is the true algebraic sum of all the relevant factors.

After six months careful study of the possible methods of electrification a conclusion has been reached. The work has been too initiative, the ground too new and the opportunity too exceptional not to have kept an accurate log upon the method of procedure. Were it possible to devote time to things other than an expeditious and careful continuance of the work begun we would gladly segregate this conclusion into its relevant factors and discuss it with those engineers who by the reservation of their concrete opinion have shown a silent wish to later agree or disagree with its plans.

To the two great electrical manufacturing companies who have placed the genius of their engineering in our hands for consideration we have nothing but the highest tribute to pay. It has been no mean privilege to make a minute study of their individual viewpoint of the problem. It is true their analysis of the situation has dictated widely separated conclusions, and those engineers who appreciate the trust imposed in this decision for the New Haven road can readily understand that the divergence of opinion has served only to double the responsibility of the conclusion but by which the engineers for the New Haven road are in no way disturbed.

To those minds prone to a conclusion without the assistance of the relevant factors it may be a helping thought to say that throughout the study of the New Haven's electrification the Central's plans have been a constant and most relevant factor. The conditions of the New Haven problem, however, are widely different. It has been deemed that alternating current is pertinent to their proper fulfillment. Because the New Haven locomotives will be operative either on direct or alternating current in no way emphasizes the importance of their interchangeability. The condition imposed in effect makes valuable the double characteristic. A criticism of the Central's plans is irrelevant and unnecessary; direct current propulsion is the judgment of their engineers. Our concern is its effect upon us and it is read in the direct current characteristic of our locomotive.

W. S. MURRAY,  
Electrical Engineer, New York, New Haven & Hartford Railroad.

#### Picked Up on the Platform.

Nantucket Lightship, Nov. 11, 1905.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Many of your readers must have been well entertained by your recent publications of paragraphs about things "Picked Up on the Road"; but things that are Forced Down Our Throats on the road—and at stations, sometimes stir our feelings, and in such a way that things picked up are for the time being of no account. Have you ever noticed what a heap of inconvenience passengers make for themselves at large way stations, just because station agents and conductors do not co-operate in making their men show passengers what to do? With two or three coaches sandwiched between the baggage cars and the sleepers, trains often are stopped at stations so that those who are to get on find themselves at the front end of the front car when most of the vacant seats are in the rear car. Nobody at the station tells them to go to the rear before the train comes in, and so they do the best they can to fight their way in, crowding the passengers who are coming out;

and then they blunder back through two or three cars to find seats. The conductor ought to complain of the station agent, but probably he is too indolent to do so. An aggravated form of this petty nuisance may be seen in connection with heavy through trains which take on a considerable number of passengers at a second city station a mile or two out from the starting point. Such trains, with their elephantine locomotives and their fast schedules, rush past the platform in a way to convince the waiting passenger that not over 15 seconds can be allowed for the 25 or 50 passengers to get on; and yet, one night not long ago, I had to go to two trainmen 150 ft. to 200 ft. apart to find out where to enter sleeper No. 3; and then I was misinformed and had to lug a heavy suit case through the narrow passages and abrupt turns of two or three sleeping cars before I was settled. One of these men was a brakeman and the other a sleeping-car porter. A lone woman would have had the same difficulty in getting information. A half lighted platform makes such a situation worse; and if the weather is very cold it is disgraceful. No station man was in sight on the platform; and if there had been one, it is safe to bet that he would have been unable to estimate within five car-lengths where a passenger ought to stand to quickly find a given sleeping car.

We must recognize, of course, that exhibitions of such ignorance are only samples of what may be seen in other matters; that a large percentage of train and station men of all grades only now and then exercise any more energy, thought or ingenuity than they believe to be the minimum necessary to pleasantly hold their jobs. This narration of a sample incident is only intended to aid the reader to call to mind grievances of his own, and to incite him to follow my example and join the kickers.

But I, also, picked up on the road a pleasing item. I rode three hours in a cheerful and roomy day car which was well ventilated without the opening of either a deck sash or a window. It was well warmed and after dark was beautifully lighted by 20 of the new gas lamps in which an incandescent mantle is the distinguishing feature. It is true that the ventilating arrangements were not severely tested, for the car was not over half full of passengers and the weather was not wintry; still it was a pleasing change from the ordinary passenger car. Moreover, the interior woodwork was light colored and pleasing, the carvings were unobtrusive and chaste, yet suggestive of all desirable richness, and the colored glass and the brass work were in good taste. No railroad need longer have unattractive passenger cars for lack of excellent examples to copy. Being a kicker, I am bound to give you also the two unfavorable impressions of that passenger car. In the first place, by reason of poorly designed or improperly adjusted springs it was by no means a smooth-riding car. It was not remarkably bad, but there was a constant jarring which, considering that the company's heavy 12-wheel cars run smoothly over the same track, was an annoyance to a railroad man with an idle mind. In the second place, the "SPITTING PROHIBITED" notice was painted on the panel above the doorways. To me this reminder of filth produced nearly the same unpleasant effect as would have been caused by some unclean person spitting on the wall of the car. I recognize that to repress the boors who befool cars with their exhortations it is necessary to post notices; and the notices must be plain in language and loud in appearance. But I like to comfort myself with the notion—perhaps it is more or less of a delusion—that some time we shall become sufficiently civilized to get along without conspicuous notices; and therefore, as a means of supporting my delusion, I would put the placard on paper, in a frame, hung on a hook, and thus give it the appearance, at least, of a temporary expedient, instead of making it a permanent fixture.

KRITIK.

#### The Cape Government Railways.

In the *Railroad Gazette*, August 4, 1905, a historical sketch was printed of the development of the railroad system in South Africa, with particular reference to the changes since the Boer war. At the August meeting of the Engineering Section of the British Association at Cape Town, a paper was read by A. M. Tippet, Chief Resident Engineer of the Cape Government Railways, which contains much additional information with regard to the working of the lines. Through the courtesy of Mr. Tippet we are enabled to print the following abstract of this paper:

It will be recollected that the railroad development of Cape Colony was undertaken primarily by three main systems, which are now connected, but were formerly entirely separate. The chief of these is known as the Western system, starting from Cape Town and running approximately northeast through Cape Colony and Bechuanaland to Vryburg, 774 miles, on to Victoria Falls, 870 miles further. This latter section is not a part of the Cape system, however, but is the property of the Rhodesia Railways. For the first 109 miles the line traverses the low-lying, rich and picturesque lands of the Cape Town district, with the largest agricultural output of the colony and with towns more numerous than elsewhere. At a distance of 129 miles from Cape Town the railway ascends to the highlands, with severe grades and through



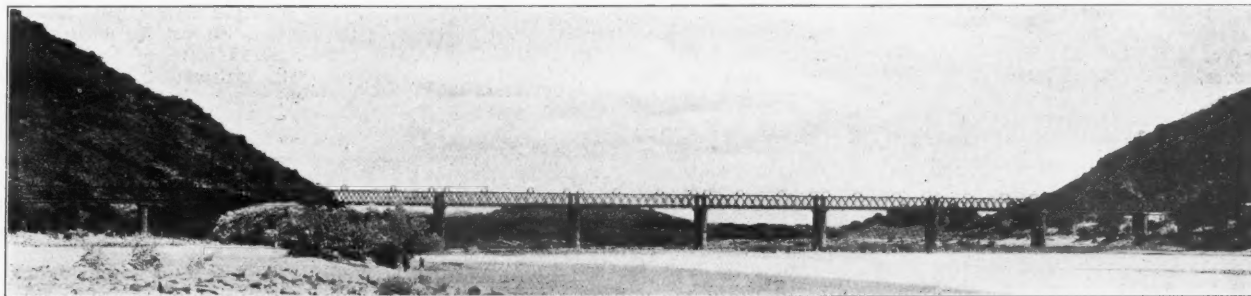
a region of very light traffic. Kimberly, in this section of the line, is 4,012 ft. above sea level. Farther on in Bechuanaland the character of the country again alters, becoming more wooded and better watered.

The system second in importance is the Midland, which starts from Port Elizabeth and connects with the Orange River Colony system. The Eastern system, the third in importance, starts from East London, higher up the east coast than Port Elizabeth, and has a more northerly direction than the others, gradually converging to them until it joins the Midland extension in the Orange River Colony.

The normal gage of these lines is 3 ft. 6 in., including the main routes, the ordinary branches, and the pioneer, or developing branches. There are also two lines of 2 ft., or narrow gage; one running from Port Elizabeth to Avontuur, which is to all intents a main line; the other, from Kalabas to Kraal and Hopefield, which is a branch or trading line. The rails are flat-footed,

between 2 ft. and 3 ft. 6 in. is enough to balance the objections to the narrow gage, and especially to break of gage in a railroad system.

With land cheap and skilled labor dear, there are only 10 tunnels in the Cape Government system. All of these are for single track and the longest of them is 936 ft. long. There are a number of large bridges, but with the exception of a few special 150 ft. spans the 130 ft. span girders are the largest at present in use; the Orange river bridge consisting of 11 spans of 130 ft., the Vaal river bridge consisting of 11 spans of 130 ft., etc. The piers of nearly all these bridges are of cast iron cylinders, 6 ft. internal diameter, placed two for each pier, spaced at 15 ft. 6 in. centers, filled with concrete and connected by diaphragms. During the war the Boers partially destroyed three of these large bridges, which were rebuilt by Cape engineers. Mr. Tippet says in his paper that a very interesting account might be written of the railroad wrecking done by the Boers during the war, and of the temporary



The Norval Pont Bridge, Cape Government Railways.

fastened directly to the ties in the American way, and they weigh from 46¼ to 100 lbs. to the yard. Joints are of the ordinary strap fishplate type with four holes, though on some parts of the line angle plates have been used. The platforms in the chief stations are of concrete, stone, or brick, and are level with the floor of the car, as in British practice; but at the smaller stations they are lower, the top of the coping being 18 in. above rail level. The lines generally, though not up to the standard of English railroads, are well built and well equipped, taking into consideration the gage, sparse population and small traffic. The branch lines are laid with less ballast, lighter rails, averaging from 46¼ to 60 lbs. section, and much simpler station buildings, etc. Most of these are of wood and corrugated iron, for galvanized corrugated iron has played a very important part in railroad development in the country, and every station, village and town has still a large percentage of iron buildings.

expedients adopted to move traffic. Some bridges, as for example, the Bethulie, were destroyed with some science by cutting the lower chords in the center with small charges of dynamite, so that the girders collapsed. The Fourteen Streams bridge, however, was attacked in a very unscientific manner, dynamite having been used on the bearing girders of the cylinder piers. After repeated attempts, the heads of piers and the ends of many of the girders were shattered. The road, it is true, was blocked and broken, but no span was entirely dropped.

The ties now universally used on the Cape Government Railways are of the ordinary timber transverse type, although many experiments were tried in the early days with other kinds. The first railway to Wellington was originally of 4 ft. 8½ in. gage, laid with iron rails on longitudinal timbers. These were replaced by transverse ties and the gage was altered to 3 ft. 6 in. on the acquisition of the line by the Government. About the same time a con-



Typical Wayside Station, Cape Government Railways.

The 2-ft. gage lines have been tried as an experiment in economy for certain classes of traffic. The longest of these, still building, and referred to above as designed to run from Port Elizabeth to Avontuur, will be 178 miles long. The other is 47 miles long. It is doubted whether the natural difficulties to be overcome in building the Avontuur line are of such magnitude as to largely affect first cost in comparison with the light 3 ft. 6 in. line, and the traffic, which is chiefly agricultural produce, is bulky and not the best adapted for narrow gage. The other 2-ft. line, known as the Kalabas-Kraal & Hopefield, is of easy construction, being practically a surface line. Its chief traffic is bulky farm produce, and its start is from an up-country junction, necessitating trans-shipment, so that it appears to have little to recommend it as an experiment in narrow gage. The management chose 2 ft. rather than 2 ft. 6 in. gage, as showing a larger difference in first cost, where it was desired to effect economies, but it is believed to be questionable whether the difference in cost

siderable amount of cast iron bowl or pot sleepers were used, the rails resting directly on the bowls, which were connected by a wrought iron tie. Wrought iron trough sleepers were tried later in the belief that they would be cheaper than the timber sleeper owing to their assumed longer life, and also because they would resist the white ant, which in some parts of the country destroyed all untreated wood and even treated wood, to some extent, when the cresoting had washed out. These iron ties were introduced in 1881 and were used until 1895, when it was seen that they had certain serious objections, such as corrosion of the metal under the rail, working loose of the rivets, and cracking across through the rivet holes owing to defects in the ballast. It was also found that large numbers were crumpled and rendered useless by derailments. Since 1895 these metal ties have been gradually replaced by timber and no more have been imported. Australian hard wood sleepers are now largely imported.

The signaling of the system is manual and is permissive block.

The telegraph operator at A communicates with the one at the forward station B and arranges with him for the advance of trains from either end. The operator at each end, who is in many cases the station master, writes the train order and gives it to the guard of the train, who hands it to the engine driver. There is a line clear order and an "exchange crossing" order when trains meet each other at an intermediate siding. At the siding the guards exchange orders, so that the order authorizing an up train to proceed from A and meet a down train at an intermediate siding is handed over at that siding to the guard of the down train, and becomes his authority to proceed to A.

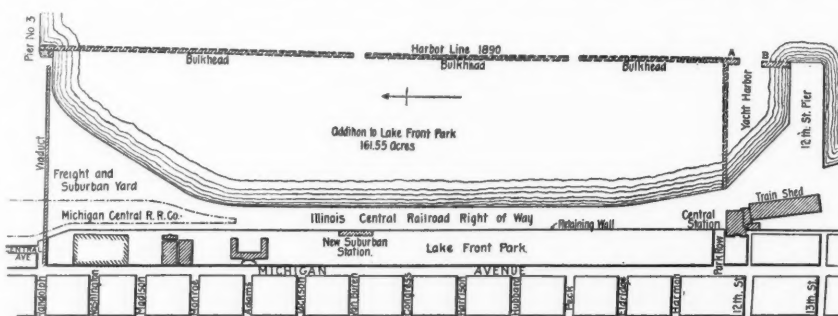
Owing to the heavy grades and severe curves train speed on the lines is rather low. The fast passenger trains to Johannesburg run over the Cape lines at an average speed of  $24\frac{1}{2}$  miles an hour, excluding stops, and  $22\frac{1}{4}$  miles an hour including stops. The ordinary passenger trains on main lines run at  $22\frac{3}{4}$  miles an hour, excluding stops, and 17 miles an hour, including stops, the considerable differences between the two speeds being due to the stops at stations for meals. The fast freight trains run at  $13\frac{1}{2}$  miles an hour including stops. Some of the suburban trains have a speed of  $25\frac{1}{4}$  miles an hour between stations. All of these speeds, however, are averages, which are of course exceeded at some portions of the runs. Speed was not much of a consideration in designing lines, as the comparison was not between railroad and railroad, but between railroad and ox cart.

As affecting traffic, the results of the Boer war were a greatly increased and exaggerated business during its continuance and for a short time after its ending, followed by a very much reduced traffic and depressed trade, from which the country now seems to be greatly recovering. The Cape Government Railways carried over 11,000,000 passengers during the half year ending June 30, 1904, with an average of 88.2 passengers per train and an average haul of 16 miles. The average rate per mile was approximately 1.8 cents and the net cost of working passenger traffic per passenger mile is figured at about 1.5 cents, exclusive of extraordinary expenditure and of interest. Ton mile figures are kept on the South African Railways, and the ton miles on the Cape Government system for this same half year were 246,810,221; the average haul was 186 miles and the average rate per ton mile was 3.12 cents. The average number of tons carried by each freight train is small, amounting to only  $71\frac{1}{2}$ , yet this is almost precisely the average obtained by the English lines in handling their fast goods traffic; in handling all classes of goods traffic, in fact, except coal, brick and iron.

The total mileage of the Cape system in 1904 was 2,576 open and the average cost per mile was \$10,402, which represents first cost of construction, or purchase, with subsequent additions for betterments, extra rolling stock, and other equipment.

#### Concrete Retaining Wall of the Illinois Central on the Lake Front, Chicago.

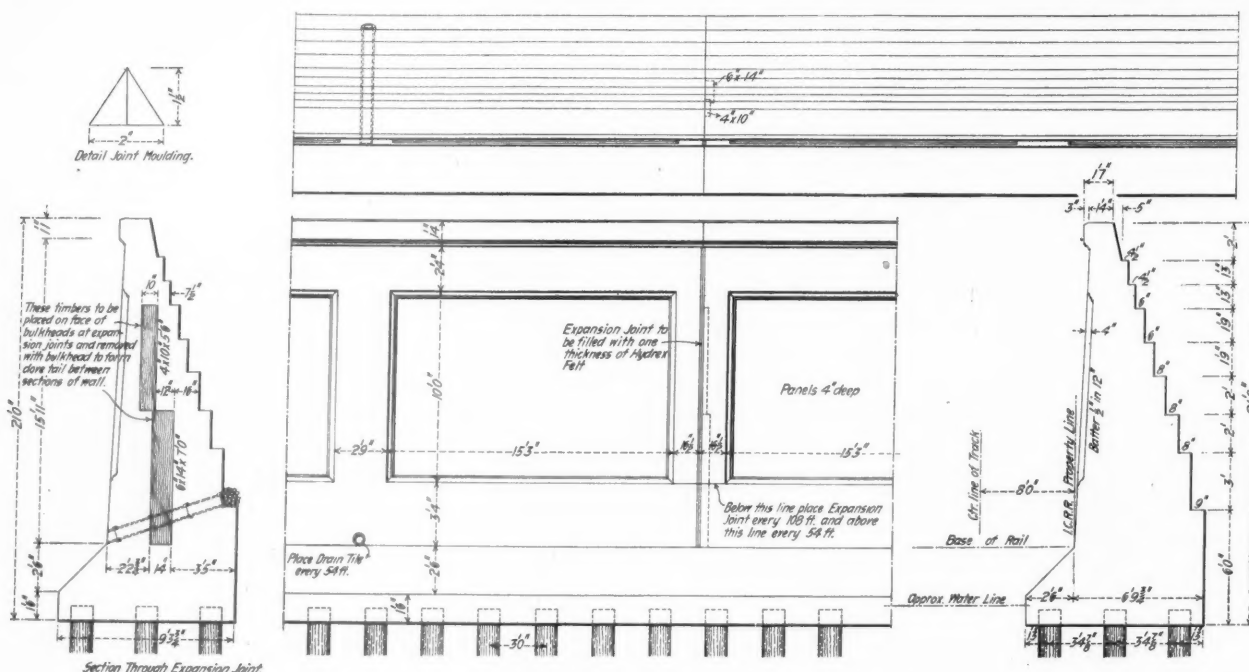
The Illinois Central Lake Front improvements in Chicago were described at length in the *Railroad Gazette*, July 10, 1896, at the time the plans were agreed on. The "Lake Front" is the part of the city water front lying between the north line of Randolph street, extending eastward into the lake, and the south line of Park Row, likewise extended. By the terms of the agreement with the city the railroad company was required to depress its tracks lying within this district to a point not to exceed 6 ft. above city datum, or about 4 ft. below the then existing grade. Masonry retaining walls 22 ft. high above city datum were to be built on each side of its 200-ft. right-of-way throughout the length of the district. It was the purpose of the city to form a Lake Front park by filling in the submerged district lying between the east retaining wall and the harbor line established by U. S. engineers in 1890, an area of about 160 acres; and also the narrow strip between the west retaining wall and Michigan avenue; both fills to be terraced up to the tops of the walls to conceal the movements of trains entirely from view. The tracks were to be bridged at important street intersections with ornamental viaducts. The



Map of Chicago Lake Front.

railroad company did most of the work called for by the plan, including the building of the Van Buren street suburban passenger station, within the next two years, and that portion of the park west of the railroad was completed. Also, the sea-wall or bulkhead along the harbor line, or east line of the proposed park, was built. This work was described in detail in the *Railroad Gazette*, Jan. 28 and Feb. 18, 1898. The accompanying map of the Lake Front is reproduced from one of these articles.

The only important part of the railroad company's work which was not completed at that time was the east retaining wall. Construction of this was deferred because the South Park Commissioners, who have control of the park, were not ready to proceed with the filling and there was no need of building the



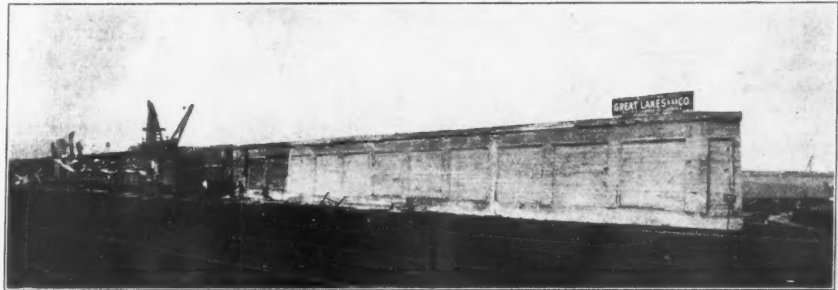
Part Side Elevation and Sections of Concrete Retaining Wall.



wall until this could be done. Some random filling with miscellaneous material from the street cleaning and building departments and by scows loaded with dredgings from the Chicago river has been going on in the time that has intervened up to the present, but lately the work was begun in earnest. The material is being obtained from the Chicago freight tunnels, from various dredging operations and particularly from Government dredging in the outer harbor. The time had therefore come to build the east retaining wall and work was begun about the first of September.

Unlike the west wall, which is rubble masonry, the east wall is concrete, drawings being shown herewith. The wall is 21 ft. high above city datum and will be 6,251 ft. long. It is 9 ft. 3 3/4 in. wide at base of foundation and is stepped down to an effective width at the top of 1 ft. 4 in. It rests on 30 ft. piles, driven three in a row, the rows being 3 ft. apart on centers. The resultant load is 26,400 lbs. for a level fill, giving 1,412 tons per sq. ft. of foundation and 13.15 tons per pile. For an 8-ft. sur-charge the resultant load is 31,750 lbs., or 1,704 tons per sq. ft. of foundation and 15.88 tons per pile. The wall has a maximum sectional area of 103.77 sq. ft. and a minimum of 100.66 sq. ft., the average being 101.25 sq. ft. The face of the wall is battered 1/2 in. to the foot, and is paneled as shown, these panels being 4 in. deep, 10 ft. high and 15 ft. 3 in. long, with a moulding at the edges. The distance, center to center, of pilasters is 18 ft. Ex-

above the other on the faces of the bulkheads of the forms and are removed with the bulkheads, leaving a groove to form a dovetail between abutting sections. One thickness of "Hydrex" felt is placed in each joint, and a triangular moulding 2 in. at the base and 1 1/2 in. high is used in the wall face at each joint. Drain tiles 6 in. in diameter run along the bottom step on the inside. They pierce the wall every 54 ft., being elevated 6 in. at a point midway between the wall openings.



South End of Retaining Wall.

A 1-3-6 mixture of concrete is being used, the total estimated amount for the wall being 22,700 yds. The concreting is divided into four courses for the height of the wall, the footing being laid first, the second course completing the foundation, and the third course going to the bottom of the panel. The section

above this is done at one time. Each course is sloped back with a 2-in. drop, and a 6-in. x 12-in. timber is laid in the top of the first three courses, leaving upon removal, a key-way for the succeeding course. The adjacent tracks are a great convenience in mixing and laying the concrete. The mixer is installed on a flat car and a platform built above it. An inclined runway extends from the platform back to the material cars coupled behind the mixer car. The materials are conveyed in wheel-barrows from the cars to the mixer. The mixer dumps into a bucket on a derrick, carried by a car which stands ahead of the mixer car.

The face of the wall will have the standard mortar finish of the Illinois Central. The end finish, as shown in the illustrations, will be in keeping with the face. Wing walls extending eastward along the north and south park lines and sloping downward as indicated, will be built when the park work reaches a point that will make them necessary.

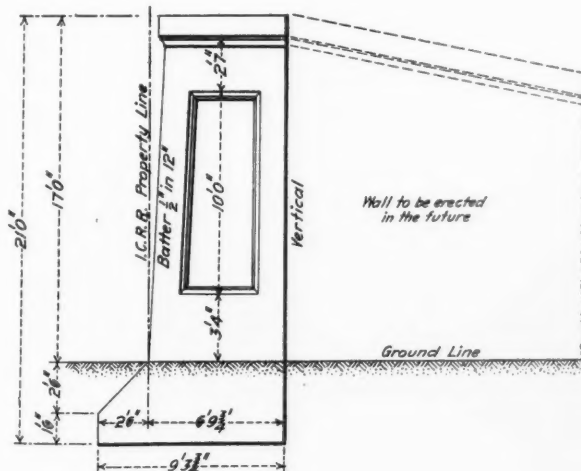
The Great Lakes Dredge & Dock Company, Chicago, has the contract for building the wall. It is to be finished by the end of the

year, and the work is being prosecuted day and night. The wall was designed and is being built under the supervision of Mr. R. E. Gaut, Engineer of Bridges of the Illinois Central, Mr. H. H. Hadsall, Assistant Engineer of Bridges, being directly in charge, aided by Mr. J. N. McLoughlin, Assistant Engineer.



South End of Illinois Central Concrete Retaining Wall on Chicago Lake Front.

pansion joints are placed at every third pilaster, or 54 ft. apart. Alternate joints extend down to the foundation, those between going only to the bottoms of the panels. A detail of these joints is shown, from which it will be seen that two timbers 4 in. x 10 in. x 5 ft. 6 in. and 6 in. x 7 in. x 7 ft. respectively are placed one



End Elevation of Retaining Wall.



Forms for Concrete Retaining Wall.

### Improvements of the New York Central & Hudson River Within the Electric Zone.\*

The two previous articles (*Railroad Gazette*, October 20 and November 10) described the physical improvements made necessary by the change of motive power and the enlargement of the terminal facilities. This article will describe the electric equipment.

#### Power Houses.

The current for operating trains in the electric zone will be generated at two power stations, at Yonkers, on the Hudson Division, and at Port Morris, on the Harlem Division, the two stations being cross-connected and each having an ultimate capacity of 30,000 kilowatts, which is sufficient to carry the entire load of a train service much greater than that now operated by steam.

The main buildings which enclose the boiler rooms, coal bunkers and the generating rooms are 167 ft. wide, 237 ft. long and 105 ft. high. The switch houses are separate buildings located about 40 ft. from the main power stations. The locations adopted, besides being near the load centers of the electric traction system, are on the waterfront and are also adjacent to existing tracks, so that coal can be delivered by boat or car.

At Port Morris the solid rock is sufficiently near the surface to warrant carrying the concrete foundation down to it, and at Yonkers a bed of hard sand and gravel forms a good bottom for a pile and concrete foundation on the particular location selected, whereas borings taken along the river front over all other portions of the territory near the load center of the electric zone showed either a great depth of silt or other unfavorable conditions.

At Port Morris a concrete bulkhead, built along one side and the outer end of the building to form a slip and dock, was used as a portion of a cofferdam for excavating the foundation, an existing embankment over a sewer forming one wing to reach the shore and a timber cofferdam forming the other. An intercepting ditch on the land side caught the water which drained in from a swamp, and this, together with the seepage through the cofferdam, was easily disposed of with pumps. Excavation was made to rock over the entire area covered by the buildings. In some places the rock was disintegrated and in others it was extremely hard. The surface also was very irregular, making a wide variation in the height of the piers, the maximum height being about 32 ft. A portion of the rock was excavated in order to build the intake and discharge tunnels of the circulating system for the condensers at the proper elevation.

At Port Morris the piping for steam and other connections to the turbine room is carried through tunnels under the floor of the power house. After building the tunnels and piers for columns and foundations for the generators and boilers, the area was filled with sand up to the level of the floor. The concrete floor and walls of the pipe tunnels which extend below the water line are waterproofed with alternate layers of coal tar pitch and felt.

The work on the foundations included 26,000 cu. yds. of earth excavation; 4,500 cu. yds. of rock excavation; 16,500 cu. yds. of concrete; 5,000 sq. yds. of waterproofing, and 25,000 cu. yds. of back filling. The slip and bulkhead wall required 11,000 cu. yds. of earth excavation; 5,000 cu. yds. of rock excavation, and 2,500 cu. yds. of concrete.

The Yonkers power station is built entirely on land under water at a point where the main line of the Hudson Division runs along the bank of the Hudson river with only a ripped slope outside of the tracks. The land on the other side of the tracks rises abruptly and is valuable for residential purposes. On the site selected for the power station the water runs from a depth of 8 ft. near the shore to 16 ft. at the outer end, the bottom being sand and gravel. As the first step in construction, the piles forming the foundation, spaced in general 3 ft. apart under walls, piers and machinery and somewhat further apart under the floor, were driven to refusal, four marine pile drivers being employed in the work. The area was then surrounded with a cofferdam formed of a single course of 12-in. x 12-in. timbers with 3-in. x 4-in. strips spiked to the edges so as to form a tongue and groove joint. The driving point of each timber was beveled on the edge away from the timber previously driven in order to force them as close together as possible, and great care was taken to see that no pebbles or other obstructions were allowed to get between the timbers and open the joint. Some of the joints which leaked between high and low water as the water was being pumped out were battened with canvas and a few joints under water were caulked by a diver. When the water was finally pumped out, however, there was no difficulty in keeping the bottom dry with an 8-in. pump, although the interior was excavated to a depth of about 20 ft. below the surface of the water at the offshore end. The piles were in general cut off at an elevation of 8 ft. below mean high water and the bottom of the concrete foundations was laid 1 ft. below the heads of piles or at an elevation — 9 ft.

Under the intake and discharge tunnels for the circulating system for the condensers the bottom of the concrete reached a depth of about 18 ft. below high water, and under the tunnel for the coal and ash hoist, a depth of 13 ft. In the Yonkers power house there is no pipe tunnel under the floor as at Port Morris, the piping in the turbine room being carried under transverse galleries.

The main bed of the concrete foundation is 4 ft. thick, bringing the elevation up to — 5, above which the walls and piers for the superstructure and machinery are carried up individually, the spaces between being filled with sand up to elevation 0, over which a 6-in. concrete floor is laid.

Waterproofing consisting of alternate layers of coal tar pitch and felt is laid in a horizontal plane in the concrete bed at an elevation 6 in. above the tops of piles and is carried up the side walls above high water. Six-ply waterproofing is used in all horizontal planes, five-ply in all vertical planes in the building, and four-ply around all ducts exposed to surface or tide water.

In order to take up any tensile stresses in the foundation two courses of round steel rods 1 in. in diameter are laid in each direction at right angles to each other in the bed of concrete above the plane of the waterproofing. The foundation work includes 5,540 piles, 16,500 cu. yds. of concrete, 270 tons of reinforcing rods, and 9,000 sq. yds. of waterproofing.

Aside from the foundations, the two power stations are similar in design. The base and floors are of concrete, the framework of steel, all designed so as to give no inaccessible surfaces; the walls are brick and tile, and the roofs are of concrete roofing slabs covered with copper, with standing seam joints. There are 2,800 tons of steel structure in each power station. There are two Custodis radial brick stacks, 15 ft. 6 in. inside diameter, and 250 ft. high above grates at each power station. They are supported on steel columns and a concrete and steel staging 40 ft. above the boiler room floor, the main boiler room alley passing underneath.

In interior arrangement the power stations are divided by a brick wall into the turbine room, 69 ft. x 231 ft. 8 in., which is open to the roof, and a boiler room 88 ft. x 231 ft. 8 in. over which the coal bunkers of 3,500 tons capacity are placed.

At Port Morris there are three galleries on one side of the turbine room, the first gallery being used as a shop, the second as an operating gallery, and the third for offices. At Yonkers the level of the first gallery is carried across the room as the operating floor with walkways between the generators. The exciters are placed under the galleries on the level of the operating floor, the operating gallery being immediately above them and the top gallery being used for offices and shops.

Coal delivered at the power stations on cars is dumped from the cars into pockets from which it is delivered by suspended-flight scraper conveyors into the hoppers of crushers, where it is reduced to the proper size for handling with the mechanical stokers. From the crushers it passes into a pocket conveyor which lifts it to the top of the building and delivers it to longitudinal conveyors of the suspended-flight scraper type which dump it into the coal bunkers over the boiler room. From the bunkers it is delivered through vertical down-spouts to Roney mechanical stokers, operated by steam.

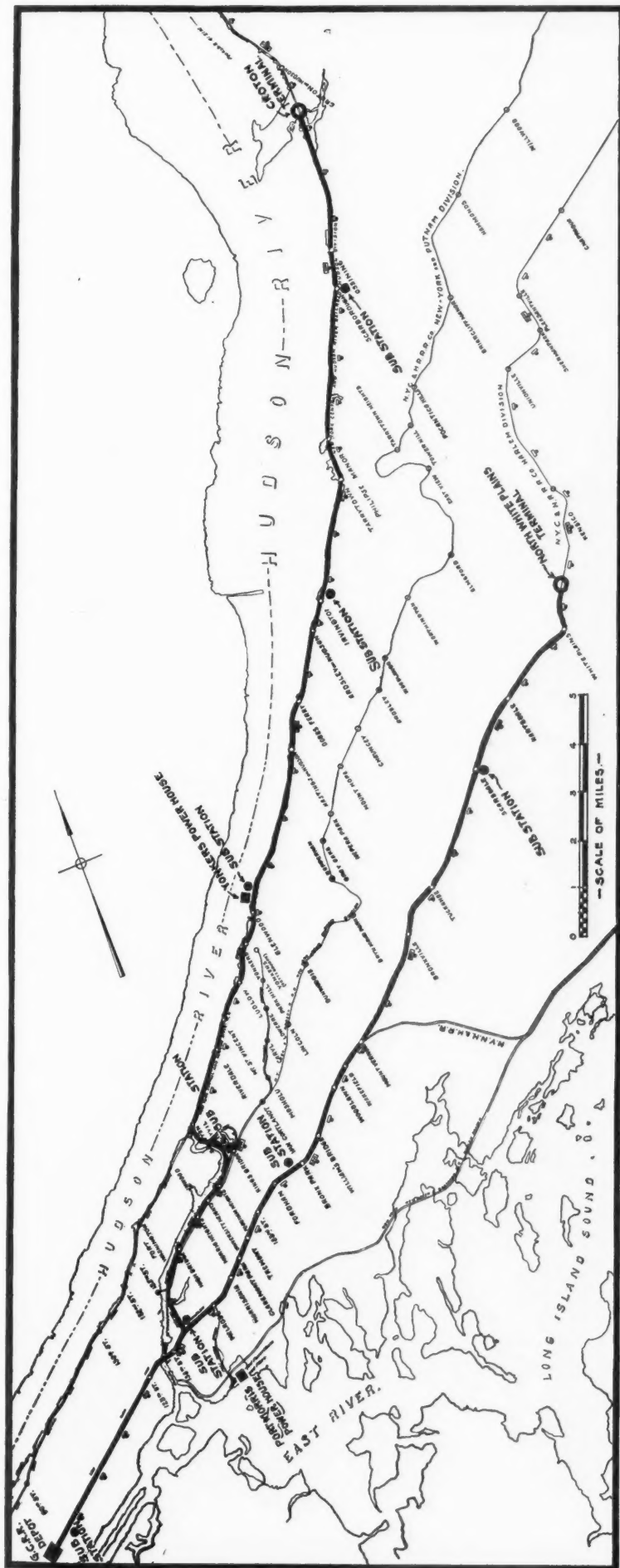
The ashes drop from the grates into hoppers from which they are collected in push cars of one ton capacity running in an ash tunnel in the boiler room basement. These cars are dumped into a hopper from which the ashes are lifted by means of a bucket conveyor into an ash storage bin directly over the coal trestle, from which they can be dropped through a spout in the bottom of the hopper into a car. Cars on the trestle are spotted by means of an electric winch. Coal delivered by boat is hoisted in a clam-shell bucket of one ton capacity, operated by a steam hoist.

The coal handling capacity is 80 tons per hour and the ash handling capacity is 25 tons per hour. The maximum coal consumption at the power stations will be about 220 tons per day. Aside from the hoist for unloading coal from boats, which is steam operated, the coal handling apparatus is all driven by electric motors. The conveyors are driven by 220-volt, three-phase induction motors, varying in capacity from 7½ h.p. for the ash conveyor to 40 h.p. for the coal crusher and conveyors.

Each power station has a battery of 24 Babcock & Wilcox water-tube boilers, rated at 625 h.p. each, all located on one floor and arranged 12 on each side of a central alley. The total heating surface of each boiler is 6,250 sq. ft. and the grate surface is 112 sq. ft., giving a ratio of 55.8. The boilers are designed for a normal working pressure of 185 lbs. and the steam will be superheated to 200 deg. Fahr. above the temperature due to steam pressure. The superheaters in each boiler will contain 1,230 sq. ft. of heating surface, and they are made up of 168 2-in. tubes each 13 ft. 5 in. long. Each section of the power station containing four boilers is equipped with one boiler feed pump of the duplex outside-packed piston type. The pumps are designed for hot water and each pump has a capacity to supply eight boilers under full load conditions. The feed water heaters are of the closed type

\*By G. R. Wadsworth, late with the New York Central, and J. C. Irwin, Assistant to Vice-President, New York Central.





Map of New York Central Electric Zone, Showing Location of Power Houses and Sub-stations.

corrugated tube Wainright counter-current design. Four boilers are piped direct to a turbo-generator and by means of cross connections adjacent boilers can be arranged to supply turbo-generators of the next group. The sectional system of piping has been followed throughout for the auxiliary machinery. The turbine room of each power station will be equipped with a 50-ton traveling crane having an auxiliary 10-ton hoist.

Each power station is designed to accommodate six 5,000-k.w. turbo-generators, four of which are being installed for initial operation. The turbines are of the Curtis five-stage vertical type. These machines are about 15 ft. in diameter at the base and 35 ft. high from the floor to the top of the generator.

The turbine structure is mounted on a cast-iron base forming an exhaust chamber in which is provided the opening to the condenser and to free atmospheric exhaust. The shaft of the turbine is separated from that of the generator above, the connection between the two being made by a coupling so that the machine can be readily taken apart. The shaft is borne by a step-bearing consisting of two cast-iron blocks between which water is used for lubrication under a pressure of 800 lbs. per sq. in. exerting a sufficient force to slightly raise the moving structure. One individual pump is provided for each turbine for the lubricating system, and in addition to this, two larger pumps, in connection with two accumulators, insure uninterrupted pressure at the step-bearings. The governing will be effected by successive opening and closing of automatic hydraulically operated valves which deliver steam to the different sections of two sets of nozzles. The turbines will be fitted with two centrifugal devices to check any excess of speed. After either one of these devices operates, the next revolution of the machine will bring it into engagement with a lever which will trip the main stem valve cutting off immediately the driving power and allowing the machine to come to rest in the shortest possible time.

The condensers are of the counter-current surface type and each is directly connected to its turbine base and contains about 17,000 sq. ft. of cooling surface. They are guaranteed under full load to maintain a vacuum of 28 in. with cooling water at a temperature of 70 deg. Fahr. 30 in. barometer. The auxiliary condensing apparatus is composed of independent units. Circulating water pumps are of the centrifugal type directly driven by horizontal reciprocating engine. The dry vacuum pumps are of the rotative fly-wheel type with air and steam cylinders in tandem, erected on a common base. The hot-well pumps are of the two stage turbine type and are driven by direct connected d.c. electric motors.

The maker of the condensing apparatus has guaranteed that the temperature of condensed steam measured in the condenser hot well will be within 1 deg. Fahr. of that corresponding to the pressure measured in the condenser. All parts of the machinery have been designed to operate smoothly and quietly under all loads up to 50 per cent. above the normally rated capacity of the turbines. The intake and discharge circulating tunnels for the condensing system are elliptic in shape, 7 ft. 3 3/4 in. x 9 ft. 11 in.

The generators each have a capacity of 5,000 k.w. and are wound for three-phase current of 25 cycles and 11,000 volts pressure. The armatures are star-connected and the neutrals are grounded through individual cast-iron grid resistances connected to a common ground bus limiting the ground current to an amount sufficient to operate the line overload relays. The leads of the generators are brought down to the floor through brass pipes to the ducts leading to the high tension switches, the arrangement being such that no high tension conductors are exposed in the turbine room.

The exciter system at each power station will consist of two 150-k.w. turbo-generators and one 150-k.w. induction motor generator furnishing current at 125 volts pressure; also one exciter storage battery consisting of 74 cells, having a capacity of 1,200 amperes for one hour, with spare space in the tanks for increasing the capacity to 1,800 amperes for one hour. Exciter generators and battery are connected to two independent positive busses and one common

negative bus. The battery has two end cells on the positive side. One positive bus serves for field excitation of the 5,000 k.w. generators only, while the other serves for certain lights and motors in the station.

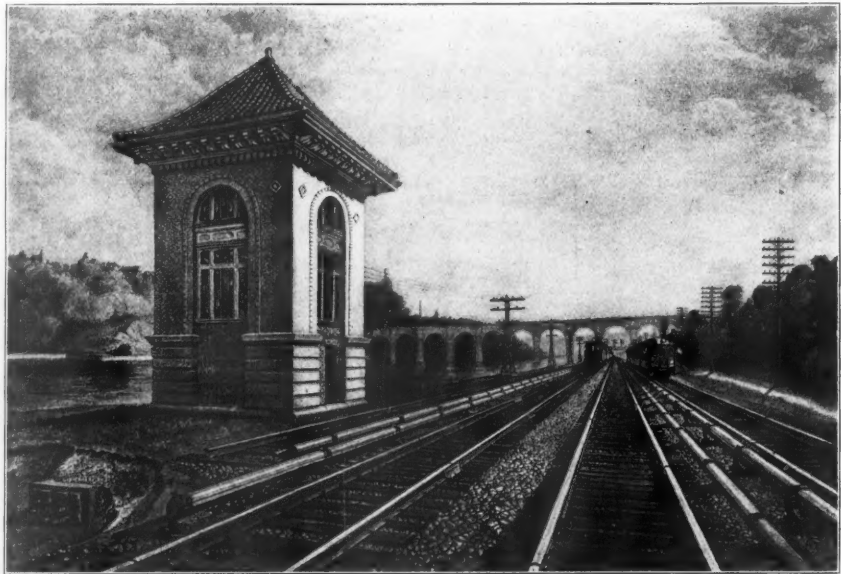
The stations will be operated from the operating gallery on the north side of the turbine room. The arrangement of the switchboards in this gallery is symmetrical and all cables and copper connections running to the switchboards are carried in concrete trenches under an Alberene stone floor. The main operating switchboard containing all the control switches and the instruments necessary for the operation of the station is located in the center of the operating gallery. A set of two exciter switchboards is located on each side; the main operating switchboard as well as the exciter switchboards are enclosed in an operating booth constructed of steel and wire glass. Three field switchboard panels are located outside on each side of the operating booth. An a.c. and a d.c. light and power switchboard on either end of the operating gallery complete the switchboard installation in the turbine room.

At both power stations switch houses have been provided separate from the main building with the idea of obtaining the best conditions for the installation of high tension switching apparatus and at the same time increasing the safety of operation. At Port Morris the switchhouse is 50 ft. 10 in. wide by 100 ft. long. At Yonkers the switchhouse and the sub-station for that district are combined in one building 37 ft. 4 in. wide by 255 ft. 4 in. long; the switchhouse occupying 147 ft. 8 in. of the length and the sub-station 107 ft. 8 in. In the switchhouses are installed the high tension switching equipment consisting of bus-bars, oil switches, instrument transformers, etc.; also such instruments as are required for the complete equipment of generating stations but which are not essential for the operator. The switchhouse also contains auxiliary boards which allow the main operating switchboard in the turbine room to be put out of service if it should be desirable for the purpose of cleaning and repairs. These boards will also permit the operation of the station should the main operating board become disabled by an accident.

Two high tension busses are installed in the basement of the

the oil switches. All relays are of the inverse time limit, bellows type.

All high tension connections and apparatus are located in the basement of the switchhouse and no such apparatus is located on the first floor, except the oil switches to which connections are made from the basement through the floor. The basement is made



Cable Tower, Transmission Line and Typical Four-Track Roadbed.

inaccessible to any but authorized workmen, and by removing the high tension apparatus from the power station itself into a confined space in a separate building the danger of coming in contact with high tension apparatus is reduced to a minimum.

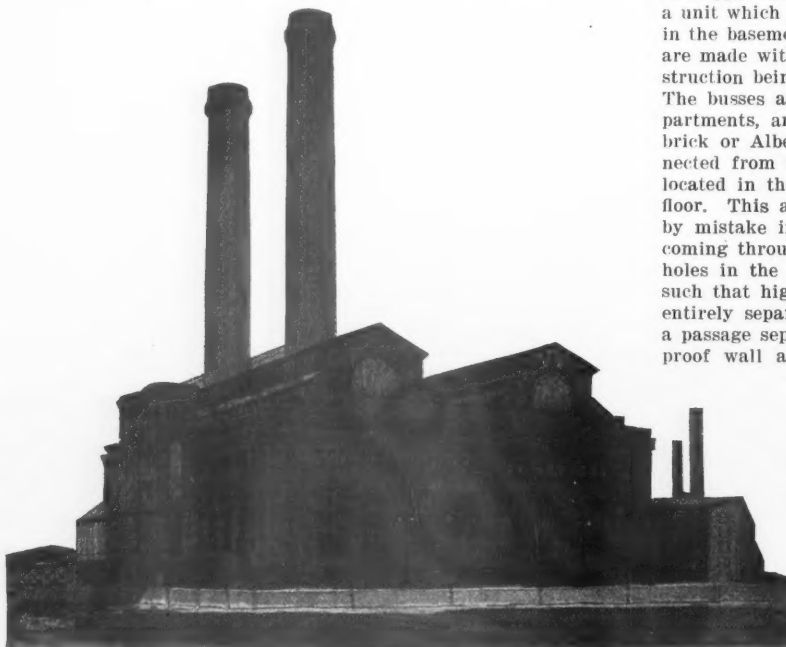
On the second floor are located the load dispatcher's office, the exciter battery with booster and switchboard, laboratory, storeroom, toilet rooms and the apparatus for the hot air heating and ventilating systems.

The arrangement of oil switches and connections is such that the apparatus belonging to one generator and three feeders form a unit which is entirely separated from the others by fireproof walls in the basement. All connections between oil switches and bus-bars are made with bare copper tubing 1 1/4 in. outside diameter, the construction being such that practically no insulators will be required. The busses are enclosed in vertical brick and Alberene stone compartments, and all high tension connections will be separated by brick or Alberene stone barriers. The oil switches can be disconnected from the high tension system by means of knife switches located in the bottom of the oil switches accessible from the first floor. This arrangement prevents accidents which might be made by mistake in disconnecting switches from live parts. All cables coming through the duct system from the power house enter manholes in the basement of the switchhouse, the arrangement being such that high tension cables enter the high tension compartments entirely separated. Low tension cables enter through manholes in a passage separated from the high tension compartments by a fireproof wall and are brought up in enclosed chases in the wall, so that they are positively insured against any accidental connection with high tension conductors. The oil switches have a rated capacity of 500 amperes, except the bus-tie switches, which have a rating of 1,200 amperes. The switches are of the motor-operated type, H-3, and have all recent improvements.

All high tension cables and the majority of the single conductor low tension cables are cambric insulated and lead covered, the insulation being 3/32 in. for high tension cables and 1/32 in. for low tension cables, with a lead cover of 3/32 in. Multiple conductor cables for instrument and control wiring have a combined cambric and rubber insulation. Single conductor cables will be used for connecting the generators with the oil switches.

About 1,000 incandescent and 36 arc lamps will be required for lighting the Port Morris power station, and 1,000 incandescent and 42 arc lamps for lighting the Yonkers power station. The amount of power required for operating auxiliary machinery equals 240 h.p. a.c. and 180 h.p. d.c. at Port Morris, and 260 h.p. a.c. and 180 h.p. d.c. at the Yonkers power station.

In each power station a load dispatcher's office has been ar-



Elevation of Yonkers Power House.

switchhouses to which the generators are connected by means of a main switch and two selector switches. The feeders are equipped with selector switches only. Overload relays are installed in the generator and feeder circuits, but the generator relays will operate only under very extreme conditions. In the generator circuits, in addition to overload relays, reverse current relays will be installed; these, however, are connected to indicating lamps only, not tripping

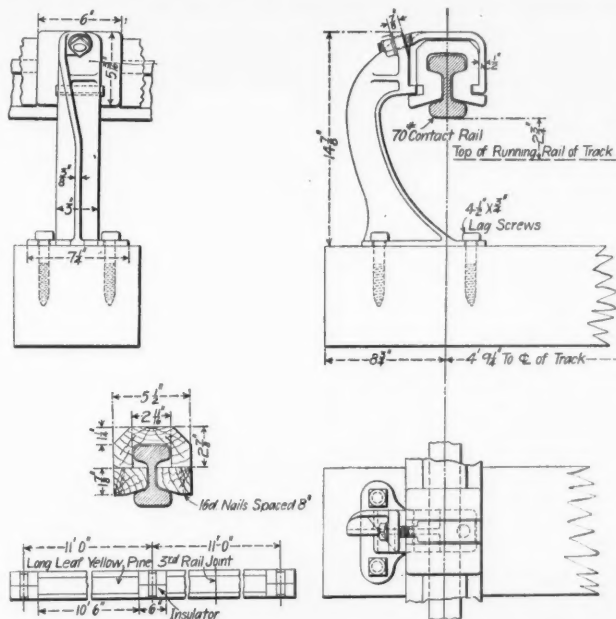


ranged for the proper distribution of power over the system, and in order to give quick relief in case of accident or trouble. Only one of these will be in service at a time. Each load dispatcher's office will be equipped with a record board indicating by means of lights and plugs which generators, lines, rotaries, etc., are in or out of service, and which switches are open or closed. An independent telephone system exclusively for the use of the load dispatcher, interconnecting both power stations, all sub-stations and the train dispatchers in the electric zone will be installed.

The principal contractors on the work are as follows:

Foundations at Yonkers.....	Walter Butler.
Foundations at Port Morris.....	D. C. Weeks & Son.
Steel work-connections.....	General Electric Co.
Superstructure at Yonkers.....	Butler Bros. Const'n Co.
Superstructure at Port Morris.....	Thompson-Starrett Co.
Turbo-generators & compl. switch. equipmt..	General Electric Co.
Exciter storage batteries.....	Electric Storage Battery Co.
Boilers.....	Babcock & Wilcox Co.
Piping.....	M. W. Kellogg & Co.
Valves.....	Best Manufacturing Co.
Stacks.....	Alphons-Custodis Chlm. Con.Co.
Condensers.....	Henry R. Worthington.
Feed-water heaters.....	Taunton Locomotive Mfg. Co.
Water feed pumps.....	Engine-Exeter Co.
Flues.....	B. R. Hart, Jr. & Co.
Coal and ash-handling apparatus.....	Exeter Machine Works.
Mechanical stokers.....	Westinghouse Machine Co.
Electric traveling cranes.....	Alfred Box Co.
Light and power equipment.....	Thompson-Starrett Co.

The 11,000 volt, three-phase a.c. will be fed through high-tension transmission lines to eight sub-stations, where the primary current will be transformed into 660 volt d.c. and fed to the working conductors. The sub-stations will be equipped with rotary converters and with storage batteries. The power houses and sub-stations will be so connected that all sub-stations can be operated from either of the main generating stations. The accompanying map shows the location of the power houses and the sub-stations.



**Detail of Supporting Brackets and Wood Protection, New York  
Central Type of Third-Rail.**

For the working conductor, or third-rail, the company has adopted the inverted or suspended type of construction, the contact being on the under head of the rail. The rail is made in special rolls of dumbbell cross sections with flattened heads, and will be protected with continuous tight fitting wooden sleeves or blocks which cover the entire surface of the rail except the contact surface. At crossings and in important yards an overhead conductor will replace the third rail, the contact shoes on the motors, even at maximum speed, engaging automatically with the conductors. For a complete description of the third-rail installation the reader is referred to the *Railroad Gazette*, September 1, 1905, p. 198.

The transmission lines will be underground in the immediate vicinity of Manhattan, and further out aerial lines on steel poles will be used. Through Park avenue tunnel and Harlem depression the ducts will be suspended on the sides of the masonry walls of the tunnels. Along Park avenue viaduct the transmission cables will be carried in special construction on top of the side girders. In connection with the new roadbed for four-tracking, the cables will be carried in separate subways on either side, or aerially. The telegraph line will in all cases be carried along the side of the right of way opposite to the aerial transmission line. The underground conduits with splicing chambers and appurtenances for the

electric transmission cables will be constructed in duplicate throughout to insure the utmost reliability of service.

Suburban trains will be operated with the multiple unit control system, in general the same as now in use on the elevated and subway lines in New York City. The steel motor cars which will be used in suburban service were described in the *Railroad Gazette*, November 3, p. 424.

All through or express trains will be hauled by electric locomotives south of Croton and White Plains terminals, where the change will be made from steam to electric operation. The terminals will include engine houses, turntables, facilities for coal and water as well as for minor repairs. In short, the requirements of a division terminal for steam locomotives have to be met together with those for electric equipment. For the latter there will be provided repair shops for the overhauling of the electrical equipment, car shops and storage yard for suburban cars, drop pits for the inspection and replacing of motors, and other facilities to meet the needs of the new type of equipment.

The company has ordered for the new service 35 electric locomotives from the General Electric Company and the American Locomotive Company, joint builders. These locomotives will be 37 ft. long over all, 27 ft. total, and 13 ft. rigid wheel base, consisting of four pairs of driving wheels with one pair of pony truck wheels at either end. The locomotives will weigh 97 tons of which 70 tons is on the four driving axles. The Pacific type, the heaviest passenger locomotive of this company, weighs 170 tons, of which 70 tons are on the driving axles. For every pound of effective drawbar pull the electric locomotive weighs less than one-half the steam locomotive, giving a consequent greater weight available for traction with less dead weight and less weight per axle. The impact, due to the reciprocating action of the counter-balanced drivers of the steam locomotive, so destructive to road-bed structures, is wholly absent in the electric locomotive.

Four 600-volt d.c. gearless motors of 550 h.p. each, one on each driving axle, will furnish the power, giving a normal rating of 2,200 h.p., with a maximum rating of about 3,000 h.p., or 50 per cent. in excess of the steam passenger locomotive weighing nearly twice as much. The locomotives will be fitted with the usual bell and whistle signals, electric air compressors for braking purposes, electric headlights, etc. Provisions will be made for heating water for supplying steam for the train heating system. The locomotives are double-ended and controlled from either end so that turning is unnecessary.

The system of multiple unit control has been adopted for the locomotives as well as for the suburban motor cars. This system makes possible the control of two or more locomotives coupled together from the head locomotive, giving absolute unity of tractive effort from a single point of control, a condition impossible with steam locomotive grouping. This system of control, with the possibilities in the variations in speed and power, effected by changing the relation of the motors from four in series through the intermediate steps to four in multiple, allows this one type of electric locomotive to replace and do the varied work of the many classes of steam locomotives in present use. From a switch engine at six miles an hour, the same unit may at will be transformed for express service at 75 miles an hour. One unit with proper motor coupling serves to haul a 200-ton train, and the same unit with another unit coupled will haul a 1,000-ton train. All these combinations of power are adapted to quickly meet the conditions giving consequent economy of operation.

The railroad company has built just west of Schenectady six miles of experimental track equipped for electric operation. Here all appliances are put to actual service tests before their adoption as standards for the work of electrification in the vicinity of New York. The first high-speed test of the electric locomotive was held with eminently successful results on this experimental track on Nov. 12, 1904, in the presence of the Electric Traction Commission and many distinguished guests.

The design and installation of electric equipment and appliances is in charge of the Electric Traction Commission of the railroad company, which consists of Mr. Wm. J. Wilgus, Vice-President of the N. Y. C. & H. R., Chairman; Mr. John F. Deems, General Superintendent of Motive Power; Mr. Bion J. Arnold, Consulting Engineer and Past President of the American Institute of Electrical Engineers; Mr. Frank J. Sprague, Consulting Engineer and Past President of the American Institute of Electrical Engineers, and Mr. George Gibbs, Consulting Engineer, with Mr. Edwin B. Katte, Electrical Engineer of the railroad company, as Secretary to the Commission.

At some points the improvements are well under way, and the company anticipates the adoption of electric power, at least through Park avenue tunnel to temporary terminals north of the Harlem river well in advance of the date fixed by law, June, 1908. This procedure of electrifying an initial zone to temporary terminals, in advance of completing the entire territory is now under way. The company desires as speedily as possible to abate the smoke nuisance through the tunnel, not only to afford relief to

the discomfort of its patrons, but also to make possible more frequent and faster train service through the tunnel to relieve in a measure the congestion of traffic at the station, and so facilitate the execution of the Grand Central yard improvements.

The entire improvements as outlined, involving an expenditure of some 60 million dollars, are under the direct charge of Mr. Wm. J. Wilgus, Vice-President of the company.

### The Cost of Locomotive Operation.

#### XVI.

BY GEORGE R. HENDERSON.

(Continued from page 450.)

#### FIREMEN.

This cost is almost identical, in its nature, with that considered in Article XIV, page 421, but the rates are less. We shall exhibit rates for firemen on the roads previously illustrated, and so that these schedules may be identified with those for engineers, will simply affix the letter "f" to the number; thus, schedule "1" for engineers and "1f" for firemen cover the same territory.

#### Schedule 1 f.

Compensation of firemen in passenger service.

Rate per 100 Miles or Less per Day.

	Districts			
	A.	B.	C.	D.
8-wheel locomotives	\$2.10	\$2.25	\$2.25	\$2.19
10-wheel; less than 50 tons on drivers	2.20	2.35	2.36	2.30
10-wheel; more than 50 tons on drivers	2.30	2.45	2.45	2.40
Prairie	2.35	2.50	2.50	2.45
Mogul	2.35	2.50	2.50	2.45
Consolidation:				
Less than 67 tons on drivers	2.30	2.64	2.50	2.45
More than 67 tons on drivers	2.35	2.64	2.50	2.45

Over 100 miles will be paid pro rata.

#### Schedule 2 f.

Rate per 100 Miles or Less per Day.

	Districts						
	A.	B.	C.	D.	E.	F.	G.
8-wheel locomotives	\$2.30	\$2.30	\$2.49	\$2.39	\$2.39	\$2.60	\$2.30
10-whl.; less than 50 tons on drivers	2.40	2.40	2.60	2.49	2.60	2.60	2.40
More than 50 tons on drivers	2.50	2.50	2.70	2.60	2.60	2.60	2.40
Prairie	2.60	3.10	3.10	3.00	3.00	2.60	2.40
Mogul	2.60	3.10	3.10	3.00	3.00	2.60	2.40
Consolidation:							
Less than 67 tons on drivers	2.49	2.49	2.60	2.58	2.58	2.60	2.49
More than 67 tons on drivers	2.60	3.10	3.10	3.00	3.00	2.60	2.58

Over 100 miles will be paid pro rata.

It will be here noticed that the variation is different from what it is in the engineer's schedule. In that, the 8-wheel and light 10-wheel engines paid the same rate throughout—here it is different in all but one instance. Again, schedule 2 allowed the same for all engines on district G; here there are four different rates on this district. Very often a rate is made for a certain class of engine on a district upon which it does not run, this being considered a concession; and while it may appear irregular, it does not really affect the cost. Again, the enginemen and firemen belong to separate organizations, and these matters are usually taken up with them at different times, thus causing inconsistencies in the rates. In a general way, it will be noticed that the firemen's pay is, in these schedules, about five-eighths of that for engineers.

On local freights there is an extra allowance of 15 cents per 100 miles. Helper engines entitle the firemen to from \$2.53 to \$3.10 per day of 12 consecutive hours, with overtime pro rata. If over 100 miles are made within the first 12-hour shift, one-tenth of the daily rate per hour will be paid for the excess, but all work after 12 hours is paid by the hour. These are the rates in mountain territory—on the plains they run from \$2.15 to \$2.45, depending upon the size of the engine.

In switching service the rate runs from \$1.90 to \$2.30 per day of 10 hours. If called and not used, 33½ miles are allowed, as for the enginemen. These special rules are practically the same as in force for the enginemen.

#### Schedule 3 f.

Road Service.

Class of Engine.	Passenger.	Freight.	Way Freight.
8-wheel, 18-in. cylinder and under	\$2.25	\$2.30	\$2.50
8-wheel, 19 to 21-in. cylinders	2.35	2.35	2.50
Atlantic type	2.40	2.40	2.70
10-wheel, 18 and 19-in. cylinders	2.50	2.60	2.80
10-wheel, 20-in. cylinders	2.60	2.75	2.90

These rates are for 100 miles or less, and freight mileage over 100 miles is paid pro rata. Switching service is paid \$1.95 and \$2, and 2,600 miles per month are guaranteed to all assigned men.

#### Schedule 4 f.

Passenger.

Freight.

Districts	Passenger.			Freight.		
	Mountain.	dulating.	Level.	Mountain.	dulating.	Level.
8-wheel locomotives	\$2.25	\$2.10	\$2.15	\$2.49	\$2.45	\$2.45
10-whl.; w'ght on drivers:						
Less than 50 tons	2.36	2.35	2.25	2.65	2.58	2.58
More than 50 tons	2.45	2.35	2.35	2.70	2.60	2.60
Prairie	2.50	2.35	2.35	3.10	2.70	2.70
Consolidation:						
Less than 67 tons*	2.50	2.35	2.35	2.85	2.60	2.60
More than 67 tons	2.50	2.35	2.35	3.10	2.70	2.70

\*Weight on drivers.

These rates are for 100 miles or less per day; all over 100 to be paid pro rata.

#### Schedule 6 f.

Rates per Mile in Cents.

Passenger service	1.79 cents.
Through freight	2.33 "
Local freight	2.36 "

Runs less than 100 miles are governed by a special list. Short runs are treated the same as for enginemen.

Most of the rates for firemen are about five-eighths, or 62 per cent. of the rate for enginemen, except in the last schedule, where they are very little over one-half. The same comments will apply here, on the bearing of these rates to cost of transportation, that were made in article XV, page 450. Generally, overtime arrangements are the same for firemen as enginemen, being usually equivalent to 10 miles an hour as of the rate and classification on which they are employed. Some roads, however, have a fixed rate, as we found for enginemen in a couple of cases. Thus on the road in the west, where the engineers received 36 and 32½ cents per hour, we find that full-rate firemen are paid 22½ cents per hour and junior firemen (first year) 20 cents. On the eastern road quoted, firemen receive 19 cents per hour in passenger service and 22 cents in freight. The methods used in computing overtime are the same as for enginemen.

The other items which were considered in our last chapter, viz., Delayed Time, Constructive Mileage, Pooling and Effect of Speed, need no further examination here, as the same arguments and considerations will apply as well to the left hand side of the engine as to the right. For ordinary estimates and statements, we can take 1½ times the amount paid the engineman to represent the wages of the engine crew (engineman and fireman) and use the rules and schedules given in article XV.

#### Hostling and Turning.

It is customary in this country, for enginemen of incoming trains to leave their locomotives on some designated standing track, where the "hostler" or "engine despatcher" takes it and places it successively by the coal trestle and water tank or stand pipe, filling up the tender, the ash pit, to have the fire cleaned, and over the turntable and into the roundhouse. This proceeding may be modified in some cases, but in general it follows the above schedule. In taking engines out of the house, in some cases this is done by the enginemen, and in others by hostlers; passenger locomotives, having definite leaving times, are more usually taken out by their own crews.

In many cases the wages of hostlers go into a general account of "roundhouse labor," which includes wiping, inspection and various other small charges. The *Railroad Gazette* of Feb. 19, 1904, however, gave considerable data on the various details of roundhouse charges, from which we gathered the following points:

#### Cost of Hostling per Engine.

An Eastern railroad from	39 to 54 cents.
A Southern railroad, from	15 to 78 "
A Western railroad, averaged	33 "
Another Western railroad, averaged	80 "

There is a great variation in these figures, no doubt depending largely upon the conditions existing at different points, and the number of engines cared for. As an average, however, we would expect 50 cents to cover the cost of "hostling" a locomotive.

The cost of turning depends upon the facilities with which the terminal is equipped. If the table be operated by hand, as in days (mostly) gone by, the question of balancing and friction of the table under load will be of great importance. It has been no uncommon thing to see four or even eight men pulling around an engine of great weight upon an old table, too weak for the load and too short to permit the locomotive to be balanced upon it. When this is the case (and it too often is) it is usual to call out the wipers, and as often as an engine must be turned these men drop their other duties and man the bar. The exact cost of such an operation must depend entirely upon the number of engines turned a day, and the size of the gang necessary to move the table.

On the other hand, turntables equipped with motors are very expeditious and save time as well as labor. As a rule, one man is continually on duty to manipulate the table, and when the number turned is very large, requiring rapid work, a helper is sometimes employed to "spot" the engines. At the Chicago avenue roundhouse of the C. & N.W. Ry. as many as 400 engines are turned a day, many not passing into the house, but merely turning for suburban work. It formerly required four men continually on this table, but the application of an electric motor disposed of this gang, and turned the engines in less than one-quarter the time. In fact, the motor handled the engines with so much ease that at one time, when repairs were necessary, a gang of eight men were put on the table in order not to delay the turning of the locomotives, as the motor had set a pace which the four men previously used could not maintain.

There have been various reports on the cost of turning locomotives by hand and power made at different times to the railroad associations. It is generally conceded that the power turn-

ing is cheaper if the number of engines turned is large. The cost of installing a steam, electric or gasoline motor has been stated to run between \$1,000 and \$1,200, providing that electric current is available; if a dynamo and engine must be purchased for this work it will double the above cost. The Tatlow motor, operated by air from the compressed supply of the locomotive on the table, will cost only about half as much, but if there is no engine on the table, or if the engine be "dead," the table must be turned by hand.

The cost of turning locomotives by power at six points on the Lehigh Valley for one year was reported as follows:

	Engines	Average cost	
		Horse power. per day.	Per engine.
Gasolene motor .....	5	170	\$3.78 2.22 cts.
" " .....	5	110	3.40 3.09 "
" " .....	5	194	3.55 1.83 "
" " .....	5	121	3.41 2.90 "
" " .....	5	46	2.91 6.50 "
Electric motor.....	20	140	3.99 2.85 "

This shows the cost fairly constant per day at about \$3.50.

From the data given above it should be a simple matter for anyone to estimate approximately the amount which it is costing to turn engines at a given point, by knowing the conditions existing at that locality.

(To be continued.)

#### Time Freight on the Erie.\*

The system of handling and keeping a record of the movement of fast freight on the Erie Railroad differs fundamentally from any of the systems previously described as used on other roads. The principle on which it is based is the grouping of cars containing freight of similar classification from one point to another point and making one manifest for the group of cars instead of for each car separately. This simplifies the telegraphing and introduces no other complications.

All freight on this road is divided into four general classifications as follows: Quick despatch, time freight, continuous move-

ERIE R. R. CO.			
CARD WAY-BILL.			
<b>QUICK DESPATCH AND TIME FREIGHT</b>		TRAIN NUMBER	
Total Weight Car and Lading	Initials	CAR NUMBER	
Ms.			
When transferred, cross out above and enter below initials and number of new car, also total weight of new car and lading.			
Date of Way-Bill the ..... 190			
Billed from			
Billed to			
<b>STOP CAR</b>			
At	For		
At	For		
Lading			
Final Destination			
CONSIGNEE			
When consigned "To Order," "Lift Bill of Lading," etc., so state above.			
Roads Routed Over	R.R.	Junction Points Via	
When destined beyond point billed to, show routing on line below.			
ROADS VIA			
CAR WEIGHED	Gross	Tare	
At	Lading	Authorized	
the ..... 190	Allowance	NET	
Weighmaster.			

Fig. 1—Front of Card Way-Bill for Quick Despatch and Time Freight.

If only 50 engines are turned it will amount to about 7 cents an engine—if 200 be turned less than 2 cents. Where hand power is used, and, say, three men are required, the cost would probably be 4 or 5 cents per engine, assuming that these men are otherwise employed between turnings. It would probably not pay to install a power outfit on less than 50 locomotives turned in 24 hours; for 75 or more there is little doubt as to the advisability of such an expenditure. Where more than one man is constantly employed on this work, to the exclusion of other duties, it will be a paying investment.

The estimated costs of operation per day of 24 hours, based on turning 250 engines, was given by a committee as below:

Electric motor (without special dynamo).....	\$3.92
Steam engine .....	4.40
Gasolene motor .....	3.95

These figures include labor, fuel or current, supplies and repairs, but not interest and depreciation.

#### INSTRUCTIONS.

1. Agents must see that they are furnished with Way-Bills for all loaded cars received on Card Way-Bills.
2. Stamps must not be used hereon (on either side) unless authorized.
3. When transferred, show under remarks, date, where, why and condition of freight.
4. When any special or additional information must be shown on Card Way-Bills, enter same under Remarks.
5. When specially instructed or classification conditions require it, Billing Agents must fill in below amount of prepaid or collect.
6. Agents at stop-off stations must show in table below stop-off charges to be collected at destination. When stop-off charges are not to be collected at destination, note under "Remarks" that stops were made, showing dates, etc.

Prepaid \$.....

To Collect \$.....

Special Collection to be Made on this Freight on Delivery			Amount
For	At		
For	At		
Special Debit to Receiving Agent,			\$

#### REMARKS

#### CONDUCTORS WILL FILL IN BELOW MOVEMENT OF CAR.

Train Number	Points Between	Date	Hour	Min.	A.M. or P.M.
	Left				M.
	Arr'd at				M.
	Left				M.
	Arr'd at				M.
	Left				M.
	Arr'd at				M.
	Left				M.
	Arr'd at				M.
	Left				M.
	Arr'd at				M.
	Left				M.
	Arr'd at				M.
	Left				M.
	Arr'd at				M.
	Left				M.
	Arr'd at				M.
	Left				M.
	Arr'd at				M.

Fig. 2—Back of Card Way-Bill for Quick Despatch and Time Freight.

ment, and ordinary. Quick despatch freight and time freight are designated under the generic term "manifest freight." Certain commodities are billed for movement in certain trains as shown in the freight train book and the classification into quick despatch, time freight, etc., is made on the basis of the train in which the commodities are to be moved. Quick despatch freight consists of all commodities billed for movement in trains Nos. 77, 78, 80, 87 and 88. Time freight consists of all commodities billed for movement in trains Nos. 75, 76, 85 and 86. Continuous movement freight consists of all commodities billed for movement in trains Nos. 73 and 74. Ordinary freight consists of all other freight not billed for movement in any of the trains specified above.

Trains Nos. 77, 78, 80, 87 and 88 carrying quick despatch freight

\*For previous time freight articles, see Sept. 8, Great Northern; Sept. 29, Southern Railway; Sept. 1, Chicago & North-Western (Sept. 22, Chicago Freight Terminals); August 25, Atchafalpa, Topeka & Santa Fe, and Boston & Maine; August 18, St. Louis & San Francisco.



are fast through trains between Jersey City, Buffalo and Chicago in both directions, making the run from Jersey City to Chicago in 52 hours, and to Buffalo in 21 hours. The classification for train No. 77, for example, is as follows: Merchandise cars covered by loading orders. From New York Terminals—carloads of dried fruits and nuts; import onions for Cleveland and points west of Galion. From New York Terminals, Newark, Newburgh, points via N. Y., N. H. & H. connection at Maybrook, Carbondale, Newberry Junction, Binghamton and points via Binghamton, Rochester—carloads of third-class freight and higher for Jamestown and points beyond. From Marion, Ohio.—Boat freight from N. & W. This train leaves Jersey City daily except Sunday at 7.50 p.m., and Port Jervis daily at 12.55 a.m. Cars loaded for this train are collected at the close of the day from the various freight houses and piers around New York harbor and ferried to Jersey City, where the train is made up. This train picks up and sets out merchandise cars at important points along the route, which are to be delivered to or have been received from small stations beyond. It is run in sections when necessary, cars for points farthest west being given preference in making up the first section. Only air-brake cars are received for movement in this train. The other westbound train of this class, No. 87, leaves Jersey City at 7.05 p.m. daily except Sunday with similar classification of freight for Buffalo and points beyond via the Grand Trunk, Michigan Central, Pere Marquette and the N. Y., C. & St. L. Trains 78, 80 and 88 are eastbound freights originating at Chicago and Buffalo, and carrying the same high-class commodities. They leave daily after the closing of the freight houses and arrive in Jersey City about 56 hours later.

The time freight trains Nos. 75, 76, 85 and 86 run on a slower schedule of 76 hours from Jersey City to Chicago and 29 hours to Buffalo. They carry fourth-class carload freight from New York terminals, Newark, Newburgh, points via Maybrook, Dundee, Binghamton and points via Binghamton, Elmira, Corning and points south, and Rochester to points west, and also certain specified shipments of lower class freight from these points. Division and general freight agents at Pittsburg, Cleveland and other important stations are authorized to instruct agents to card waybill for movement in these trains such other commodities as in their judgment may be necessary in emergency cases. All cars shipped in these trains must be air-braked.

Continuous movement trains Nos. 73 and 74 carry fourth and fifth-class freight between all important stations from Jersey City to Chicago. They make the run between these two cities in 96 hours. Cars in these trains are not manifested. When necessary to fill out any of these fast freight trains, cars of the next lowest classification are used, preference being given to long haul shipments first.

Twenty-six of the principal stations on the road are authorized to manifest fast freight as follows: Akron, Bergen, Binghamton, Chicago—51st street, Cleveland, Corning, East Buffalo, Elmira, Galion, Griffith, Hammond, Hornellsville, Huntington, Jamestown, Jersey City, Kent, Marion, Meadville, North Judson, Ohio City, Port Jervis, Rochester, Salamanca, Susquehanna, Suspension Bridge and Youngstown. Each manifest station numbers its manifests commencing with 1 each day. In telegraphing to the superintendent of transportation a record of these manifests, the station calling precedes its call letters by the date of the month and follows by the number of the manifest. For example: The first manifest reported from Jersey City on October 1 would be sent 1-J.C.-1, and the tenth manifest on October 2 would read 2-J.C.-10. The manifest covering cars for the nearest destination is given the lowest number and manifests for succeeding destinations are given successive numbers. For example: Jersey City forwards freight on manifests destined to Binghamton, Elmira and Chicago. The lowest number would be given to the manifest covering the shipment to Binghamton, the next number to the manifest of cars to Elmira and the highest number to cars for Chicago. Where cars are loaded for points off the company's line they are manifested under the same shipment of cars to the junction point. Thus: No. 77 may have 10 cars out of Jersey City for Huntington and four cars to St. Louis via Huntington. The 14 cars would be covered by the same manifest to Huntington.

As soon as cars are ready for movement from any manifest station they are properly card-billed with the card bills shown in Fig. 1 and Fig. 2. These bills are printed on cards 4 in. x 9½ in., the bills for quick despatch and time freight cars being printed on red cards, continuous movement freight cars on green cards and ordinary freight cars on manilla cards. These card bills accompany the car in transit and are delivered by the conductor to the agent at destination. If the car is set out before reaching destination the card waybill is left at the set out station with the agent and delivered by him to the conductor picking up the car on the following train.

When the train of manifest freight is ready to be made up the yardmaster or agent makes out a manifest form, Fig. 3, for each consignment of one or more cars to the different stations on the line. These are numbered consecutively and give full information

## ERIE RAILROAD. Manifest Freight.

SIGNAL XI.

Office Rec'd from		Sent by		Rec'd by		Time Rec'd		Station		Date,		190	
<div style="display: flex; justify-content: space-between;"> <div> <p>A—Manifest Number</p> <p>B—Movement Billed For</p> <p>C—Manifested to</p> </div> <div> <p>SIGNATURE</p> <p>Signature,</p> <p>Agent or Y. M.</p> </div> </div>													
Initials of Cars	Car Numbers	Contents	Consignee	Final Destination	Time and Date Rec'd from Conn. or Ready for Transit	Date	From	To	* CARS SET OFF SHORT OF DESTINATION OR END OF RUN				
									Set Out At Station	Time Set Out	Date Set Out	Cause for Set Out If in Bad Order Give Extent of Damage	
D	F	J	M	N	O								

\* This information to be filled in by Conductors Handling.

Fig. 3—Manifest Form for Recording Shipment of Fast Freight.

<b>SIGNAL X2</b>		<b>ERIE RAILROAD. Telegraph Manifest Freight Report.</b>						
Office Rec'd from	Sent by	Rec'd by	Time Rec'd		Office sent to	Sent by	Rec'd by	Time Sent
			M	TIME FILED	M.			M.
To Superintendent of Transportation, Jersey City, N. J.					From _____ 190			
Train No. A	Engine No. B	Departed C		For Station D		Conductor F		
		M.						
<b>WITH THE FOLLOWING MANIFEST FREIGHT.</b>								
<b>MANIFEST NOS.</b>			<b>EXCEPT FOLLOWING CARS LEFT AS PER CAUSE GIVEN</b>					
FROM LOWEST J	TO HIGHEST M	INITIALS N	CAR NUMBERS O	CAUSE S				
Signature, _____								
AGENT OR Y. M.								

Fig. 4—Form for Reporting Departure of Manifest Freight.

ERIE RAILROAD.								
Conductor's Manifest Freight Report.								
Office Rec'd from		Sent by	Rec'd by	Time Rec'd	Office Sent to	Sent by	Rec'd by	Time Sent
				M. TIME FILED	M.			M.
To Superintendent of Transportation, Jersey City, N. J.						From _____ 190		
Train No. A	Engine No. B	From Station C	Arriving at Station D	Time Arrived F	Date J			
(SHOW TOTAL No.) Cars of MANIFEST FREIGHT taken from starting point of this train were left at end of run, except as follows:								
SET OUT		MANIFEST NUMBERS		CAR		CAUSE FOR SET OUT		
At Station N	Time O	From S	To U	Initials W	Numbers X	Y		
The following Cars of MANIFEST FREIGHT were "picked up" en route, between starting point of this train and end of run:								
PICKED UP		MANIFEST NUMBERS		CAR		LEFT		
At Station AB	Time AC	From AD	To AF	Initials AG	Numbers AJ	At Station AM	Time AN	
Signature, _____ Conductor.								

Fig. 5--Form for Reporting Arrival of Manifest Freight Trains at Division Points.

[illegible]

Fig. 6—Form for Keeping Permanent Office Record of Movement of Manifest Freight.

as to the car numbers, initials, contents, destination, etc. They are made out in triplicate. One copy is furnished to the conductor of the train in which the cars covered thereby are to go forward. The second copy is transmitted by telegraph to the office of the superintendent of transportation within one hour after the train has departed. The third copy is indorsed with the train number, time and date cars were forwarded and sent to the agent at destination by train mail so as to reach him before the cars arrive if possible. Separate manifests are always made out for quick despatch and time freight shipments even if the cars go forward in the same train to the same destination. The conductor's copy of these manifests accompanies the card waybills and is endorsed by each conductor on the back with the time received and time delivered to the next conductor taking the train forward. When a car is set out which is only part of the manifest, the manifest goes forward with the remainder of the cars, the conductor endorsing on the face particulars of time, place and cause of set-out. If a number of cars constituting an entire manifest shipment are set out the conductor's blank is left with the agent and properly endorsed with time, place and cause of set-out as before, the conductor of the following train picking up the cars taking the manifest and delivering it with the cars at destination. The agent at destination returns the conductor's copies as received to the superintendent of transportation for recording and filing.

As soon as a train handling manifest freight has departed the yardmaster or agent fills out the blank, Fig. 4, showing the manifests forwarded by that train and the cars left behind, if any. When the manifests run in consecutive order only the first and last numbers are given. For example: From 1-J.C.-1 to 1-J.C.-10, or from 1-J.C.-1 to 1-J.C.-5, 1-J.C.-7 to 1-J.C.-10. If no manifest freight is forwarded the agent writes "None" across the face of the blank and reports the departure of the train as usual. One of these reports is made after the departure of the train from each manifest station along the route and serves as a passing report. This information is telegraphed to the superintendent of transportation within an hour after the train has left.

The conductor's manifest freight report, Fig. 5, is used to report the arrival of trains at division points. If no cars have been set out or picked up the conductor writes "None" across the face of the blank and it is telegraphed in to the superintendent. If cars have been picked up or set out full information is given in the spaces provided and telegraphed by the code letters.

Manifest freight originating at non-manifest stations is card-billed on a red card and forwarded by first train to the first manifest station and the agent there will add the car to one of his own manifests or make out a new manifest the same as if the freight originated at his station. Local merchandise freight for intermediate stations travels in manifest trains to the last division terminal reached before distribution begins and is forwarded from there in way trains.

The records in the office of the superintendent of transportation are not kept by means of a train board but are entered as received on large sheets ruled as in Fig. 6. These sheets are bound in book form for filing. The sheet shows the number of cars in each manifest, manifest number, destination, time ready for transit, train number in which freight goes forward, time of departure and date of set-outs and pick-ups. There are nine columns across the page for recording set-outs and pick-ups for any one manifest. One of these sheets is used for recording the day's movement of manifest freight from each manifest station.

We are indebted to Mr. C. C. Riley, Superintendent of Transportation, for the data from which this article was prepared.

#### The Incorporation of Labor Unions.

BY HOWARD E. BAYNE.

Among the remedies discussed and advocated by different publicists for the unrestrained ills of labor unions, the incorporation of them has been strenuously advocated as protection to the public against the disastrous results of irresponsible power. The unions do not like the suggestion, and as the recommendation involves, of course, incorporation made compulsory by law, they argue with much force that such enactments would mean deprivation of natural rights and encroachment upon the liberties of the citizen. But if the results were, on the whole, beneficial, the arguments of the labor unions would have to go the way of other arguments occasionally made against the tide of advancing civilization.

At a recent meeting of the American Bar Association, the president in his opening address announced the somewhat startling doctrine that as civilization advances the liberties of the individual become fewer and narrower. The learned gentleman illustrated his meaning by references to laws and ordinances which were unknown to our ancestors but are quite familiar to us. Such as the Health Law, the Game Law, the Factory Law, the Tenement House Law, the Building Code and that large body of unknown and unknowable municipal ordinances, which a citizen gets an inkling of, now and

then, in the police court by the illuminating experience of a fine for unconsciously breaking them.

If a hundred years ago, all at once, one of our liberty-loving ancestors had been informed, as we are daily informed, that he couldn't keep his sick son in his own home, that he couldn't shoot his own game on his own premises, that he couldn't run his own factory in his own way, that he couldn't maintain his own tenements as he saw fit, that he couldn't build on his own land as he had planned, we can imagine the indignant astonishment and the choleric protest with which these prohibitions and limitations upon his inalienable rights would be received by him. And yet we in our day have come to think them quite right and to wish and work for even greater, or at least further, encroachments upon the liberties of the individual in the interest and for the welfare of the community at large.

It is quite true, liberty is fullest in barbarism; restraint is greatest in civilization. Strange as it may seem, it is a law that liberty recedes as civilization advances. The converse is equally true that as liberty advances, civilization recedes.

Labor unions, contrary to the common impression, do not furnish an exception to this law. It is true that such bodies originate strikes and strikes are generally productive of that barbaric liberty which enables one to knock down another at will. And labor unions are the result not of barbarism, but of a high degree of civilization.

But the excesses of the unions are no more to be attributed to civilization than the ruin wrought by misdirected power is attributable to steam or electricity. Like every other product of civilization, full of power and energy, the union needs care in handling and regulation in operating.

The union is a phase of industrial development which is neither to be ignored nor combated. Like other combinations it is a result of conditions peculiar to the times. These combinations are not accidental or adventitious. They are growths, natural and useful, from the soil of industry. They are not to be dreaded, but cultivated, trained and regulated to bear their best fruit for mankind. It is no answer to this, that they are not so worked, or that they will continue to be not so worked, for a long time to come. Study and discussion, aided by experience, will do for the union what they have done for other means of elevating mankind and making more effective and useful its energies.

How may we help the union to work out speedily and well its destiny?

This is the question we have got to answer, sooner or later. We may shun it, but we cannot escape it. We may suppress it, but it will not down. The union has come to stay with us and we have got to make the best of it and the most of it. And when we do this, the union will rise and shine. It will take its place among the factors of civilization, working out great results for us all, a very present help in time of trouble. That may be a long time off, but it is bound to come in the end.

It is argued in favor of compulsory incorporation that all corporations, being creations of the state, are subject to its inspection, and that if labor unions be incorporated they will be subject to regulation as other corporations are, and to that publicity of objects and operation to which all corporate bodies must submit. These results might certainly be expected with confidence but the question still remains whether the greatest evils of unions would be thereby rooted out or prevented.

There is attached to the union, in the common opinion, one thing which not only has no necessary connection with it, but is foreign to its natural development and destructive of its mission. And this is violence attending strikes. The strike itself is a useful weapon for defense in the last resort, not for offence at the first opportunity. Violence is not only not essential to the successful issue of the strike, but is distinctly hostile to its efficacy and welfare. Strikes never succeed by reason of violence but in spite of it. A strike is an abrupt and complete suspension of work at the instance of the workmen, occurring by reason of a grievance. Its effect is greatest when on a just occasion it produces paralysis of all operation in the industry where it occurs. Its real power lies in its ability to affect economic results, not those foreign, criminal accompaniments which usually disgrace the exercise of the power. Its influence is greatest when its cause is just and its maintenance is free from violence and crime. A strike is said to be successful when it accomplishes, in whole or in part, a removal of the grievance it was instituted to abate. The influence of a strike is not measured by its success. An unsuccessful strike, justly provoked and lawfully conducted, is far more influential than a successful strike unjustly provoked and unlawfully conducted, because it is supported by public opinion and maintained in a manner consonant with industrial development. Such a strike tells most powerfully in time.

The mission of the union is to secure the highest wage and the shortest day consistent with industrial welfare. Over-stepping this limit, though possible from its power, redounds ultimately not in good but in evil to the union, because any disturbance of sound in-



dustrial conditions operates most unfavorably in the end upon those who as a class support the union. In short, the union approaches its greatest success as it operates along the lines of industrial progress considered from a general and not an individual standpoint.

We may inquire now in what respect would compulsory incorporation help the union, for if it be not for the union a help towards its real mission, it is rather a harm than a benefit to any one else. The answer to this may be that the purpose of incorporation is not aid to the union but protection to the public. In other words compulsory incorporation is advocated as a measure to prevent crime and not for the purpose of advancing industry or improving the condition of the laboring class. Any measure really preventing crime is doubtless commendable unless it is so drastic as to prevent not only crime but progress also.

The question is not whether enactments preventing crime are salutary but whether labor union incorporation will have that effect. Now the first answer is that, historically speaking, incorporation has not heretofore been used for that purpose but has been employed up to this time merely as a means of carrying on most conveniently commercial and industrial enterprises of various kinds. Compulsory incorporation is an untried experiment, but that is not conclusive against the experiment if it promises well enough to be tried.

Incorporation imposes, or may impose, the duty of publicity and fixes or may fix the obligations of union membership. But these do not determine or affect the unknown quantities that we are searching for, how does violence originate, what inspires and directs it, who is responsible for it? Crime is an individual act. No union, corporate or incorporate, ever did or will tolerate formal rules or by-laws, providing for violence in strikes. However much individuals may favor it or do it, they are not so stark mad as to confess it and publish it in the rules of their associations. Criminals do not operate that way.

No provision that we are familiar with in the corporation statutes of any kind would tend to prevent or moderate in any degree violence in strikes.

Strikes themselves are lawful. Incorporation therefore would not affect them. If they are to be controlled, or regulated by a higher power than the union itself, it must be by statute directly bearing on the subject. Whether that may be safely attempted is a matter for discussion. The present theory is rather to leave strikes to be regulated by the union under the restraint of intelligent public opinion. What amendment to this doctrine may be required in the interest of the general public time alone can tell. But whatever else may be useful or necessary, it seems reasonably clear that compulsory incorporation of the union in itself can be of no value or force in preventing or diminishing those excesses of improvidence or those acts of violence which accompany most strikes and deal such deadly blows to the cause of labor.

#### Sentiment in Favor of Federal Rate Regulation.\*

BY CHESTER ARTHUR LEGG.

Realizing that the action of the Senate in pigeon-holing the Esch-Townsend bill to extend the powers of the Interstate Commerce Commission, but arrested and did not kill this movement and anticipating an even more urgent demand for the proposed legislation in the coming session, as a representative of the *Transcript* I traveled throughout that section of the country where the movement seemed strongest, to study at first hand the complaints of the public and the replies of the railroad officials. Starting at Buffalo and Pittsburg as the eastern termini, I worked westward to the cities on the Missouri river, then north to St. Paul and Minneapolis and back through Wisconsin to Chicago. At every place I called upon the representative shippers, large and small, of grain, coal, lumber, food supplies, etc., and heard from them their several complaints. At the same time, desiring to see both sides, I called upon and talked over the whole problem with the men who control the traffic policy upon every large system of railroad traversing that vast area of territory. In every place it was the facts as to the local situation which alone interested me, as I feel that the national demand for this legislation is but the sum total of the sentiment which prevails in each locality throughout the country. Starting out as I did in ignorance of the extent and basis of the movement, I was not in complete sympathy with its progress, but, after considerable thought and observation of the problem at first hand, familiar as I am with its virtues as demonstrated by shippers who by hard experience have come to learn the im-

potency of the Commission as now constituted and familiar, too, with the lurid pictures which the railroad officials with practical unanimity paint of its dangers, I am thoroughly convinced of the justice, necessity and practicability of the proposed Federal control of railroad rates.

One thought struck me time and again throughout my trip: the great interest the shippers are taking in the question and the comparatively small interest the consumer feels in it, although he is the one primarily interested. The movement among the shippers and their organizations, however, is intense and this is particularly true the farther west one goes. The appeals of the President, the Industrial Commission and the Interstate Commerce Commission have met a hearty response in the petitions of about 300 of the leading commercial and industrial associations in the country, comprising about 1,000,000 shippers and receivers of goods.

The composition of this great movement must also be understood to be appreciated. When one railroad president was asked a few months ago how he accounted for the popularity of the movement, he replied, "Oh! free lunches are always popular." I should like to say that if that gentleman or any other is laboring under the hallucination that it is the "free lunch," or "hordes of discontent" who are supporting this demand, he is making a great mistake. It has behind it the solid, conservative business men and business organizations, boards of trade, etc., in all parts of the country. Among all the men I met and talked with, I did not find one who was actuated in his support of the President's idea by a feeling of hostility to the railroads. I appreciate that there are many people especially among the farming element in the west who are not disposed to deal at all times fairly with the railroads, but this movement is not finding its greatest support from that class. On the other hand, are the railroad officials as sympathetic with the position of the people? I must admit I did not find it so as a general proposition. In Vol. I, page 234, of the recent hearings before the Senate Interstate Commerce Committee, Milton H. Smith, President of the Louisville & Nashville Railroad, says: "The present agitation has been largely prompted and promoted by a department of the Government, aided by persons who gain a livelihood by agitation—by striving to create friction between the carriers and their patrons, in doing which they have not hesitated, in some instances ignorantly, to disseminate erroneous information. Many, perhaps, most of the petitions presented, or filed before the Congressional committees are fakes," etc. This scathing criticism of the present movement may be merely the expression of Mr. Smith's individual opinion, but in its general tenor it represents, I fully believe, the attitude of many railroad officials of the country.

The next feeling that dawns upon one in his study of traffic problems is their immensity—their complexity. As one prominent merchant in St. Louis expressed it, "Any man who starts out to master the details of freight rates and freight traffic will be in the insane asylum before he gets fairly started." The extent of the conflicting interests is something appalling. Let me give a simple illustration: The miller wants the rates upon wheat to be high so as to keep the wheat in this country. The producer and shipper of wheat wants it low so as to allow them to reach out in competition with the other wheat-growing countries of the world. This problem of the relation between the rates on wheat and flour has been an unending source of worry to the traffic official upon the western and northwestern roads. The same holds true of the relative rates between cattle and dressed beef and many other illustrations could be given. Then there is the problem of rate adjustment between cities and between the markets which all of those cities must, or declare they must, reach. Another source of anxiety to the traffic man is the constant rise of entirely new industries and products, the rates of which must be adjusted not only so that the latter can do business, but, so that there will be as little interference with some other competing product as possible. The result is that the traffic man's position is a hard one, but it draws to it the ablest men in this country. One cannot help thinking as he observes the judgment, the tact and knowledge required of the railroad traffic men in this country that if they put into their own business the same energy and zeal they devote to the interests of our railroads, they would be millionaires many times over in a few years. But, as a matter of fact what is true of the traffic department is true of every department of our railroads—in no other business are there so many men of ability and talents working for so little compensation as upon the American railroad.

The railroad rate problem is not the same in the east as in the west; it is not the same to the large shipper who gives to the railroad from 10 to 100 cars a day as to the man who ships seldom and then in quantities from a few hundred pounds to a carload. And in this latter category I do not refer to the difference in the probability of one getting rebates and the other being denied them. With the iniquity of rebating entirely eradicated, there is and there always will be, an advantage in being a large shipper. I merely throw this out as a suggestion here because I shall have something definite to say as to those advantages later. If my analysis of the question is correct, one would expect to find the least sup-

\*This article is reprinted from the *Boston Transcript*. Mr. Legg has evidently had personal interviews with large numbers both of shippers and railroad officers, and his work appears to have been done with the determination to present the facts fairly. He concludes that the movement for the regulation of railroad rates by the Federal government is favored by nine-tenths of the shippers in the western cities, and that what they say and do is sincere; that is, that they are not animated by an anti-railroad feeling. Mr. Legg writes from an eastern standpoint, and as he evidently has done his work with care, and insight, his statement of facts constitutes perhaps the most accurate and useful summary that has been made in connection with this subject.

port of the movement among the very large shippers in the large basing cities, the most reasonable advocates of national regulation among the moderate and small shippers of the large cities and the most radical sentiment among the small shippers at the non-competitive points and even at interior competitive points but away from the large cities. This generalization I found to be absolutely true in practice. Let me illustrate: The representatives of the United States Steel Corporation, the International Harvester Company, the Packing Companies, the Sugar Trust and the Minneapolis millers are just as determined in their opposition to the movement as the railroads themselves. And why? Because they are getting concessions? Not necessarily. They are large and prosperous, they have enjoyed their day of "favors" and their rates are the result of conditions in the past. No traffic official would dare raise a rate in the face of their opposition, whereas they feel that under Government regulation this power might not be so secure. They feel that conditions under governmental regulation could not be any better and they might be a great deal worse for them. In the second class there stand no more prominent types than Mr. B. A. Eckhart and Mr. E. S. Conway, both of Chicago, men of light and leading in that city and each firm in his conviction as to the justice of the proposed legislation. In the third class the number is too numerous to pick individuals.

In every city I visited, with one or two exceptions, I found in their commercial bodies some such division of opinion as this; about 10 per cent. of the members—those who control the vast competitive tonnage of that place—are opposed to the movement, and are perfectly well satisfied with conditions as they stand; then probably 20 per cent., composed largely of professional men and men who are not active in the organization, are absolutely indifferent; but the remaining 70 per cent., composed of the shippers who ship in but small quantities ranging from several hundred pounds to several cars a day, are enthusiastic in their support of the movement. This but applies to the cities. Away from the large cities, it appears to me that all the elements are merged into the last.

And there is a reason for this division. Leaving out the question of concessions, rebates and the like, the large shipper comes into close touch with the railroad officials. The traffic men call upon him and see that he is satisfied, and when he is not it is a simple matter for him to arrange an audience with the head of the traffic department, where his complaint is usually remedied without delay. A single illustration occurs to me. In a western city, I called upon a large manufacturer who had been drawing his raw material from a certain section of the country for many years. But, gradually the supply of raw materials there was nearing exhaustion and he was forced to go several hundred miles farther away for it. He could not move his expensive plant; he could not afford to pay a higher rate upon his raw materials than formerly. He went to Chicago, saw the Vice-President of the entire system and came home with the rate upon his raw material properly adjusted. As he told me, "When I get such treatment as that why should I favor a change?" And then the large shipper gets a quicker settlement of his claims than his smaller competitor, his car-service is more often refunded, his shipments when in car-loads are more speedily "set"—all of which to say nothing of secret rates, elevator charges, industrial road proportions and the like influence him to discourage any movement which will deprive him of such advantages. On the other hand, the small shipper as a general rule never sees an official except the local agent, who has no more authority usually to remedy rate matters than the shipper himself. When the big shipper expects a large consignment of goods and they have not arrived, the receiving agent will often "wire" all over the system to hurry them along. When the small shipper asks a similar privilege he is told he must write the agent at the forwarding station as it is against the rules for the receiving agent to trace shipments. No "midnight" tariffs are made for him and most often he ships without knowing what the rate really is. I bring this out to show that aside from anything illegal, there are many apparent reasons why a large shipper in a favored town should oppose the establishment of some form of Federal control of rates and there are many reasons why the smaller shipper sees in it his only chance of justice.

The sentiment is often expressed by railroad men that we have enough law now to correct all the abuses of railroad management, and that under the influence of the Elkins law and the injunction of the United States Court, rebates and discriminations are things of the past. This is but an effort to begot the issue. If I judge the sentiment of the people correctly, they are not interested primarily in rebates, or extortionate terminal, industrial and elevation charges. I say they are not interested primarily in these but in the rates and their relative adjustment. It is the railroads who are making such an outcry upon these abuses because it affects them directly. In fact, many a shipper told me that the more rebates there were the better he liked it. The Elkins law was an out and out railroad measure and it was cleverly used to side-track other legislation looking to the control over the rates by

the Federal Commission. If all the rebates, discriminations, extortionate charges for switching and elevation, etc., were completely eradicated, the people would still demand this legislation. The people feel that now that competition is gone in railroad management, the great corrective influence has been removed. They see, or, at least firmly believe they see, five or six men, controlling 75 per cent. of the railroad mileage of the country, sitting in New York and dictating how much the shipper and the consumer shall pay for everything he receives and ships.

That the real crux of the question with the people was not rebates, etc., but was rather a protest against the arbitrary power which now, competition being at end, our traffic officials can exercise, was forcibly illustrated by a western shipper with whom I talked. He said that he wanted to get hogs from a certain place and he went to the traffic officials of a certain line to arrange it. "Oh! we cannot let you draw any hogs from there," said the official. "Why not?" the shipper asked. "Well we have to draw the line somewhere and we might just as well draw it right here." Is it any wonder that that shipper went away denouncing the system which could give men such power? Another illustration: The Frisco system has within a few years got control of the C. & E. I. with its extensive coal interests in Illinois. Upon its main line in Missouri there are also great coal interests which have always supplied the market of St. Louis. Since the absorption of the C. & E. I. the officials, for reasons which appear good to them, have practically forbidden the Missouri coal operators to market their coal in St. Louis, in order to open that city to the Illinois coal. As a traffic official of that system told me in his explanation of this situation, "We can handle the Illinois coal into St. Louis at a less cost and so we are forcing the Missouri operator to seek his market in Memphis, Kansas City and the west."

I sat down with a general freight agent one afternoon before a large map of his system. One of the shippers in that place had complained that the rates for a certain distance in one state were so much greater than the rates for a corresponding distance in another state over the same system. It was all over prairie country, and the cost of transportation did not vary an iota. I located the places upon the map before us and asked the official why there was such a variance. Without a moment's hesitation he replied, "Well, I can get that higher rate in the one instance and I can't get it in the other." I cite these illustrations of many that occur to me to try and show that the real demand of the shippers is not against rebates per se, but against the power which a few men who control our railroad system have of dictating the character and extent of the industry in every section of the country.

This, then, is the real demand of the shipper: that there be some impartial body before which he can lay his complaint, which body after a full and fair hearing of both sides shall have the power to decide what is a reasonable charge for the carrier to exact for the service complained of. What are the answers which the carriers make to the establishment of such a body? They are the same from one end of the country to the other. In fact, with all due respect to the railroad officials I met, and they are the most affable and courteous of men, their arguments impressed me as if they had all been in conference together and had been told to say so and so. Their general line of argument was identical and almost so in sequence.

The first argument that is put forth is that the railroads should have the same freedom of action as private individuals or corporations. Before a recent convention of manufacturers, the President of a southern road said this legislation was "akin to the government saying to the manufacturers that they were charging an exorbitant price for a product and must hereafter charge a lesser price to be fixed by the commission." One would not believe until he hears from their own lips that such views could be entertained by so intelligent a body of men as our railroad officials, but no less than a score of them advanced this as their strongest argument as I sat and talked with them. Their view of it is that "the traffic work is a plain business proposition," by which I understand they mean that as the miller charges less to the one who purchases 1,000 barrels of flour than to the one who buys ten barrels, so the traffic men should be allowed to give a less rate to the man who ships 100 cars as compared to the man who ships one car. The practical application of principles so utterly fallacious is no doubt responsible for the present agitation. It has been a settled policy of our law for several hundred years that all common carriers are amenable to public control. It has been decided again and again by the highest courts in the land that they are bound first to provide adequate facilities; second, to serve without discrimination; third, to serve all who apply, and fourth, to serve for reasonable cost. In the first place, the business of transportation is carried on under special rights and privileges, including, among many others, rights of way obtained by the exercise of public authority. In the second place, railroad transportation is within certain limits a practical monopoly, and in territory which competing lines do not touch it is a complete monopoly. If a mill is situated upon a certain railroad and another is no nearer than



a mile away, there is no business alternative for that miller but to market his product over the railroad at his door. For these great privileges the carrier owes something to the public. This is the power of reasonable public control.

The apprehension is expressed in many quarters, and this is not confined to the railroad men only, that to clothe the commission with the power upon review to decide what is a "reasonable rate," is a dangerous innovation and one certain to result in the disruption of industry and a disastrous reduction in railroad earnings. To this it can be answered that the extension of the powers of the Interstate Commerce Commission as contemplated by the proposed amendment constitutes no innovation in the fundamental laws governing common carriers in this country. Under the proposed amendment the Commission and the people would only have the power to do by direct and practicable action what they now can do in fact, but only through a long drawn-out litigation in the courts. Now, when a rate of \$1.25 is complained of and a rate of \$1 is declared to be reasonable by the Commission who order the rate of \$1.25 changed, the railroads refuse to obey the order. Then the Commission takes the appeal and is sustained. The railroad reduces its rate to \$1.24. Then the whole machinery of the law must be set in motion again and can continue until the court refuses to sustain the order of the Commission. This needless waste of time, patience and expense under present conditions can be best borne by the railroads so that in most cases the rates in the above case as an illustration would stand at about \$1.20.

The second argument which the traffic officials advance against the proposed amendment is that it will take from the carriers the task of adjusting rates to commercial conditions, as they fondly claim they do, and lodge in a political body the power to make rates and schedules for all the interstate traffic of the country. They graphically describe the impossibility of five or seven men, with no knowledge or experience in the occult science of rate making, attempting to do what now is a task for hundreds with large experience and aptitude in the work. If I heard one railroad president advance this argument I heard a half dozen, "We don't believe there are any five men in the world wise enough to make the rates for this country." Again it is a great misfortune that such attempts are made to befog the issue. Nothing in the proposed legislation can be construed by the wildest stretch of the imagination as a desire to take from the carrier the initial power of making the rates. The situation will remain in that respect exactly as at present. To be sure, in many of the states the law provides that a rate can neither be raised nor lowered without the permission of the State Railroad Commission. The reasons for this drastic legislation it is not now my purpose to consider, but, sufficient to say, no such power is contemplated under the proposed amendment for the Interstate Commerce Commission. The only change desired is one which, when cases similar to those now going to the commission have been fully considered from both sides, will give that body the power to decide what is a reasonable rate, subject always to an appeal by either party to a higher court.

The establishment of any such power with the Commission, the railroad officials all contend will prevent that elasticity of rates so essential to the roads in meeting the changing demands of commerce. Every rate fixed by the Commission would be a maximum rate and when the occasion required it a rate might be reduced to any point the road saw fit and as easily restored. Personally I never heard that rates had to be raised higher than what is reasonable in order to satisfy some emergency.

Another stock argument of those who oppose the new legislation is that it can but result in a distance, or mileage, basis of rates which, it is asserted, would be disastrous to the industrial interests of the country. This fear is expressed by no less eminent an authority than Professor Hugo Meyer, who says: "The conflicts of interests between rival producing regions, manufacturing centers and trading centers are so fierce that no Government that permits itself to be drawn into them can stand up under the sectional feeling thus aroused, unless that Government shall settle those conflicts upon some hard and fast mechanical basis which permits no exercise of judgment or discretion." "These doctrines result in rates being made upon a mileage basis." In this fear it is not possible for me to share. What prevents the Commission after hearing the complaints presented to it from deciding the reasonableness of a rate according to the existing commercial conditions in the same way that now the traffic official decides it? The only difference, it appears to me, would be that whereas the latter decides it so far in the interests of the people as is consistent with the largest revenue to his road, the Commission would be disposed to look at all interests—carriers and patrons as well. This has been true also in actual practice. The people of Spokane, Washington, complained that the rate from St. Paul to that city was a combination of the rates to Seattle plus the local rate back to Spokane. In deciding this case the Commission was not disposed to determine the rate to Spokane upon a mileage basis, but, recognizing the water competition at Seattle, upheld the existing rate to Spokane. In many other cases that could be mentioned, especial-

ly in the questions of differentials between ports and cities, the Commission has shown the same tendency to look to commercial conditions forming the basis of the rates complained of as a traffic official would do. Why, with its added power, should it consider them differently?

The statement so often made by railroad men and more often repeated that the railroad freight rates in the United States are lower than in any other country in the world, demands some consideration. In the first place there is no reason why they should not be lower in the same way that passenger rates here should be higher. In a country as sparsely settled as our own, the amount of produce to ship is large, whereas the number of persons to transport is small. This condition is exactly reversed in Europe. The denser the traffic the lower the operation cost, and there should be a naturally lower freight charge here than in Europe. The first obstacle, however, in the way of a satisfactory comparison of rates here and abroad, is a standard of comparison. I was very careful to inquire throughout my investigation both of the traffic officials and shippers their opinion as to the reliability of the "per ton per mile" standard and the great majority were convinced that it was entirely unreliable. The nature of the traffic, whether local or through shipments, high or low in classification and many other factors will affect the "per ton per mile" figures without the slightest change in the rates. It is merely an average upon all the traffic carried, both local and through freight, carload and less than carload, and is obtained by dividing the gross freight earnings by the "ton-mileage" without the slightest regard to rates.

The per ton per mile rate is then no satisfactory standard of comparison. Again the rates in Europe, and particularly in England, include both the collection and delivery of the goods—services which in this country are rendered by the shipper and consignee. But, more important still, the railroad earnings there are figured upon a capitalization ranging from \$200,000 to \$300,000 per mile whereas in this country the capitalization by the most conservative estimate is not over \$65,000 a mile. And again although as the statistics show the rate per ton per mile in this country is about seven to eight mills and in England about two cents, yet the average haul of freight in the United States is about 240 miles, whereas in England it is only 25 miles. And as Mr. J. H. Call points out (p. 2711 of the recent Interstate Commerce Committee report), the cost upon all lines of railroads in the United States for 25 miles is over five cents a ton mile, or, more than twice as high as it is in England when you base it upon the average English haul. Again it should be borne in mind that the bulk of our traffic is raw materials, about 51<sup>2</sup>/<sub>10</sub> per cent. being the product of the mines, 11<sup>2</sup>/<sub>10</sub> per cent. of the forests, and 9<sup>2</sup>/<sub>10</sub> per cent. of the fields; the manufactured or finished product, which is the most expensive to handle, comprising but 14<sup>1</sup>/<sub>10</sub> per cent. of the traffic; these figures are practically reversed in Europe and therefore any rate per ton mile figures would give an erroneous impression when compared to such a figure in the United States. It might also be added that in European countries the railroads are required to carry the mails and other Government property and to transport Government officials and employees free of charge. For the first service in the United States the railroads surely are paid none too small and are prohibited from doing the latter by a national statute. Again, although it is strenuously contended that wages are higher in the United States than in Europe, the fact must not be overlooked that while in this country there are five employees to the mile at a cost of \$2,625 per year, in the United Kingdom there are 18 per mile costing \$6,000 per year, and in Russia 15 at a cost of \$4,620 per year. I have gone into this subject at length for the single purpose of showing how hazardous at present is any extensive comparison of railroad rates in this country and in Europe.

In my talks with the railroad officials they never failed to speak in a vein of censure of the ungratefulness of the people supporting this movement in that they wished now to deny to those who had so self-sacrificingly jeopardized their fortunes in the projection of our railroads so far in the advance of civilization the rewards of the game. If such an opinion is honestly entertained I am sure that it is erroneous. In the first place a careful study of the situation will soon convince one that the "valiant souls" who so jeopardized their fortunes are not now in control or in possession of our railroads. In the case of almost every large system in the west, with one or two exceptions, such as the Great Northern Railroad, by a process of bankruptcy and reorganization, the railroads have gone out of the hands of the original investors and into the hands of the "philanthropists" who now control them. In the second place, the railroads were built into the west not so much to help future generations and develop the country as to secure the immense land grants, with the invaluable deposits of coal and iron and the forests, and to saddle upon the public a greatly inflated issue of stocks and bonds. But, even at that, the alarm which the railroads have consistently tried to inspire in the minds of the investors is unfounded. The people want to deal fairly with the railroads; all they ask is that the railroads deal fairly with them.

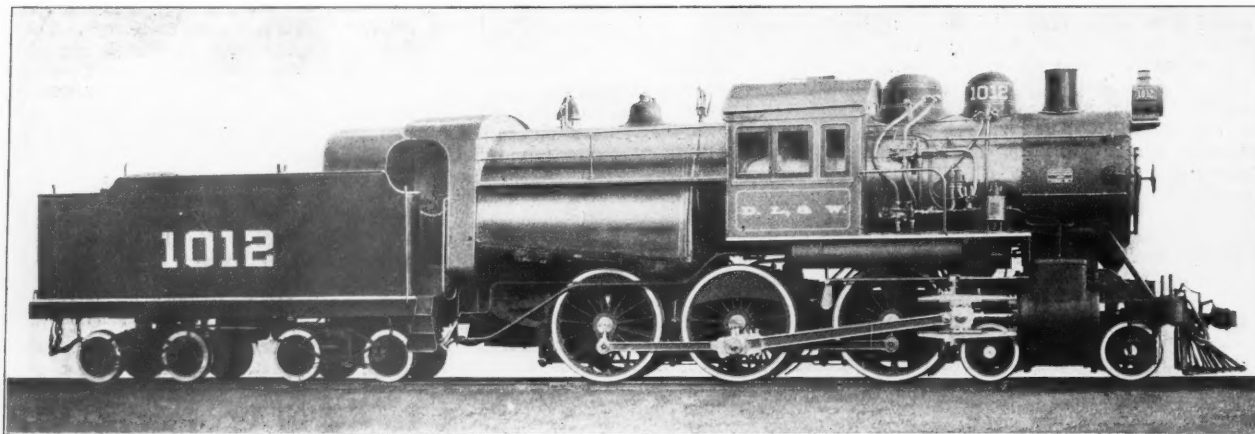


### Heavy Ten-Wheel Passenger Locomotive for the Delaware, Lackawanna & Western R. R.

The American Locomotive Co. has recently built five exceedingly heavy ten-wheeled (4-6-0) passenger locomotives at the Schenectady works for the Delaware, Lackawanna & Western R. R. The main interest in these engines centers about the fact that they are, we believe, the most powerful of the type that have ever been built for passenger service. At least we have no record of any with a tractive power as high as 35,100 lbs. The wheels, too, are large for a wide firebox, being 69 in. in diameter.

The total weight is 201,000 lbs., which is 2,000 lbs. more than

It has been found that, with the wide fireboxes, the weight of the bed of coal is apt to cause them to sag. In order to prevent too great a deflection the auxiliary supports shown at A are attached to the frames. They consist of an arch reaching across from one frame to the other with the upright pieces B fastened to the center. These latter rise to within  $\frac{3}{8}$  in. of the bottom of the grate frame. This permits a drop equal to the amount of the clearance and prevents it from becoming any more. The reason why the supports are not carried up against the frame in the first place is because it is necessary that some buckle should be allowed the grates under the action of the heat. If the supports held the frames so that they could not come down, the latter would be apt to go



Heavy Ten-Wheel Passenger Locomotive for the Delaware, Lackawanna & Western.

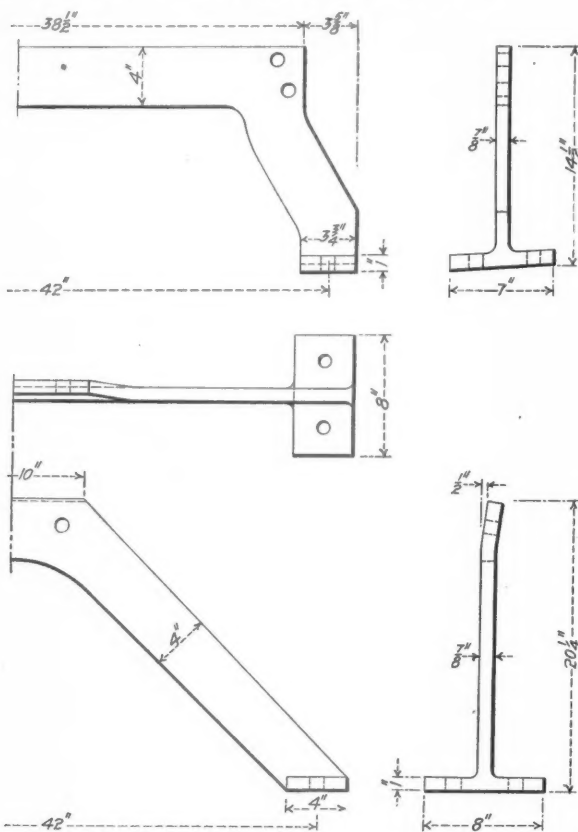
that of engines of the same type in use on the Lehigh Valley R. R. Other locomotives have been built of greater tractive effort but the weight of this engine is notably small for this effort. In appearance the arrangement of the injectors upon the side of the boiler seems to involve a complication and network of piping; but, if pains are taken to follow the runs from the dome to the check, it will be found that the complication is more in appearance than reality. Among the details of construction, that of furnishing an auxiliary support to the grates is unique and peculiar to the road.

up, either at the center or at the ends where they would lift away from the regular brackets and thus create a troublesome condition of affairs. This method overcomes that difficulty and after the settlement of  $\frac{3}{8}$  in. has taken place the grates are held firmly in position.

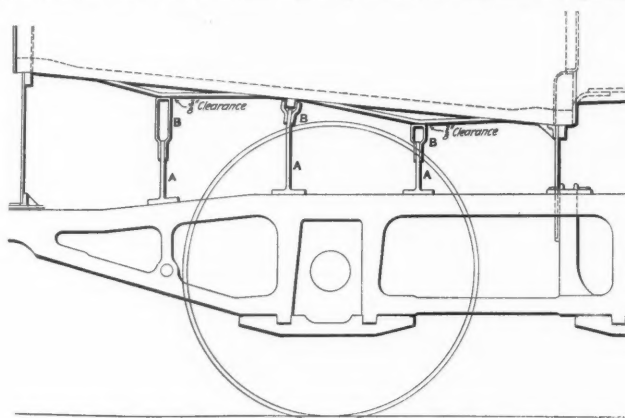
The following are the principal dimensions of this engine:

Cylinder diameter	22 $\frac{1}{2}$ in.
Piston stroke	26 " "
Wheelbase, total	25 ft. 6 in.
Wheel base, driving	14 ft. 4 " "
Weight, in working order	201,000 lbs.
Weight, on driving wheels	154,000 " "
Weight, of engine and tender	321,000 " "
Tractive power	35,100 " "
Heating surface, tubes	3,156.3 sq. ft.
" firebox	221.7 " "
" total	3,378.0 " "
Grate area	94.8 " "
Axles, main driving journal, diameter	10 in.; length, 13 in.
" truck journal, diameter	6 $\frac{1}{2}$ in.; length, 12 " "
" tender, journal, diameter	5 in.; length, 9 " "
Boiler, type	Straight top.
" outside diameter, first ring	75 $\frac{3}{4}$ in.
" thickness, crown, back and side sheets	7 $\frac{1}{2}$ in.
" thickness, shell sheets	13/16 in.
" thickness, tube sheets	9/16 in.
" thickness, water spaces	4 in.
" type of crown staying	Radial
Steam pressure	215 lbs.
Tubes—No.	398; length, 15 ft. 3 in.; diameter, 2 in.
Valves, travel	5 $\frac{1}{2}$ in.
" lap (steam)	1 in.; (exhaust) 1/16 in. & 1/32 in.
" lead in full gear	1/16 in.
Wheels, driving, diameter	69 in.; truck, 33 in.

The engine is equipped with the Westinghouse-American high-speed brake applied to both the driving and forward truck wheels. The tender has a steel frame built up of 10-in. channels and plates



Details of Frame Cross-Braces and Grate Bearing-Bar Supports—D., L. & W. 10-Wheel Locomotive.



Location of Frame Cross-Braces and Arrangement of Grate Bearing-Bar Supports as Applied to the Heavy Ten-Wheel D., L. & W. Locomotive.

and is fitted with the D. L. & W. hood at the front end. The capacity of the tank is 6,000 gallons of water, while 10 tons of coal can be carried in the fuel space.

#### Improvements at the Moncton Shops of the Intercolonial Railway of Canada.

The Intercolonial Railway of Canada is preparing plans for new locomotive shops, which are to be erected at Moncton, N. B. The cost of the new buildings alone it is estimated will be upward of \$500,000. Moncton is the headquarters for the Canadian Government Railroads and most of the repair work is done at this point. In addition to the Moncton shops other repair shops are located at various points on the lines between Montreal and Halifax, Truro to the Sidneys, and Moncton to St. John, as well as one on Prince Edward Island. The present Moncton shops were erected more than 30 years ago. The locomotive department, in which is contained the motion shop, the machine shop, the boiler shop, a brass finishing shop and a brass foundry, is all under one roof. The ground floor of this building covers an area of about 403 ft. x 95 ft. The majority of the machines in this building are of modern design but cannot be worked to advantage owing to lack of space. The present erecting shop is 210 ft. long by 138 ft. wide, and locomotives are placed on the pits by a transfer table operated by compressed air which runs through the center of the entire length of the shop. The proposed new erecting shop will be equipped with a heavy electric crane and will be of modern construction throughout. The old roundhouse, which is 225 ft. in diameter, has already been converted into an annex to the erecting shop and contains the tender shop and a tin shop. An addition of 100 ft. by 63 ft. has also been added to the old blacksmith shop, which originally measured 156 ft. x 54 ft. The furnaces in this shop are operated by under feed draft, and the equipment, including steam hammers, etc., is of modern design. The car shops have also been considerably improved by an addition of 300 ft. by 75 ft. Until recently they consisted of a paint shop, 500 ft. by 75 ft., and a freight car shop, 200 ft. by 75 ft. The wood working machine shop which was a single story structure of 236 ft. by 75 ft., has had another story added to it and an additional 250 ft. added to its length, making a first class car repair shop. There are upwards of 6,000 panes of glass in the building, thus affording exceptional lighting facilities. In the upper story of the shop the finer wood work, such as cabinet work, etc., is done. The heavier wood working machinery is on the ground floor. A new engine room has also been provided for this shop in which is installed a 300 h.p. Robb cross-compound engine which replaces a 100 h.p. engine formerly used. The entire plant has been supplied with power from a number of old locomotive boilers which were placed in various parts of the shop. These have been replaced by a new boiler house 50 ft. x 60 ft. by 75 ft. high, in which are installed four double Babcock & Wilcox boilers. The present electric plant is operated by two 275 h.p. engines, but the capacity of this plant will be more than doubled. A Pintsch gas plant and a large modern coal handling and ash handling plant are also operated in connection with the Moncton shops. The proposed improvements, which include the new locomotive shop and upwards of \$100,000 worth of new machine tools, are expected to be in working order by June, 1906.

#### Hydrostatic Tests of Locomotive Boilers.\*

BY GEORGE WAGSTAFF,  
Supervisor of Boilers, N. Y. C. & H. R.

Much has been written on this subject by the Government and insurance companies. A great number of these writings make a distinction between inspection and hydrostatic test of boilers. The subject cannot be divided, as an inspection without a test would not give sufficient evidence that the boiler was substantial to carry the pressure assigned to it; hydrostatic test without inspection would be useless, consequently it will be necessary to consider inspection and hydrostatic test together.

The object of the hydrostatic test is to ascertain if the boiler is capable of sustaining some given pressure, and also to test the joints as well as the quality of workmanship.

The only means we have of ascertaining with any degree of certainty the safety of a boiler, is by the application of pressure, which should be under conditions as similar as practicable to those of actual work. Let a boiler be ever so carefully designed and constructed according to the best knowledge acquired by careful research and long experience in the strength and disposition of its materials, and let every plate be tested before it is put in; there will still remain an element of doubt as to the actual strength of the boiler, since the material may have sustained injuries in the process of construction which may have escaped detection. In the case of a new boiler, even by a first-class maker, to say nothing

of original and hidden flaws in the plates, bars, angle irons and castings, there is always a possibility of defects such as bad welding, careless riveting, plates burnt in flanging or cracked in bending, and many other defects that may be traced to the want of skill or reckless negligence on the part of the workman.

Many cases of dangerous defects which the strictest scrutiny of the completed boiler would fail to detect, have been brought to light by the hydrostatic test combined with careful inspection. The following may be given as examples: In a new boiler the rivet holes in some of the shell plates, instead of being about  $\frac{13}{16}$ -in. in diameter, were discovered to have been repunched and made 1-in. by  $\frac{13}{16}$ -in. in order to get the  $\frac{3}{4}$ -in. rivets through the holes in the adjoining plate. The section of the adjoining plates through the line of rivets was thereby reduced 14 or 15 per cent. more than necessary, and the strength was further diminished by the presence of incipient fractures produced by the reckless use of the drift. The difficulty, or rather impossibility, of keeping the joint tight in testing by hydrostatic pressure led to the discovery of these defects which were certainly dangerous.

In another case, the gusset plates of a boiler were found to be put in between the double angle irons on ends, with the material between the holes and the edge of the plate nearly cut away. Such a defect would not be apparent to the eye, being completely concealed, nor to the ear if tested by sound, yet its presence was revealed by the bulging of the plates on testing the boiler with water pressure.

These two cases indicate the possible unreliability of the mere internal inspection of a finished boiler, and show that boilers should always be carefully inspected during construction, as well as when completed and ready for work.

The locomotive boiler does not admit of anything like proper examination. The expense of removing the tubes alone would forbid a periodical examination of the shell of the boiler, and the water spaces around the firebox are almost entirely out of sight, consequently a thorough examination is out of the question. In all cases there is only one means of testing the strength of the boiler, and that is the application of pressure.

We would not consider it practicable to allow a boiler to go through any of our shops for general repairs without having a hydrostatic test. This test to be applied before the boiler is covered so that any defects that may be found by such a test may be properly taken care of.

When we consider that a locomotive boiler is constructed with a factor of safety of between 4 and 5, it would be impossible to injure the boiler in any way by testing it at a pressure of 25 or even 50 per cent. above its rated working pressure.

The laws of the State of Massachusetts on inspection and testing locomotive boilers give the following, adopted June 1, 1901, by the Board of Railroad Commissioners under the provisions of Chapter III, Section 218, Revised Laws:

1. All boilers for locomotives before going into service must be subjected to a hydraulic pressure of not less than 25 lbs. per square inch in excess of the maximum amount to be carried when in service, and in no case less than 150 lbs. per square inch.
2. The water must be heated to near the boiling point.
3. This test must be repeated at least once a year.
4. The Superintendent of Motive Power, Master Mechanic or some other proper agent of the company will attend in person. He will remain outside while an assistant will examine the firebox from the inside.
5. A record of all tests must be made, giving dates and anything worthy of mention, and a report of the same must be made to the Board on or before the 1st day of February, annually, covering the preceding calendar year.
6. Special examinations of the stay-bolts of locomotives in service must be made not less frequently than once in three months.
7. When these examinations are made, all the water must be drawn from the boiler, so that the vibration of the sheet may indicate any unsoundness of the stay-bolt when it is struck with a hammer. When stay-bolts are drilled this test may be omitted.
8. All stay-bolts applied after this date, with the exception of crown-sheet bolts, and bolts behind frames, must be drilled from the outside  $1\frac{1}{4}$  of an inch deep and  $3\frac{1}{16}$ ths of an inch in diameter.
9. No locomotive shall continue in service with a broken stay-bolt in the top row, or with two or more broken bolts contiguous in any part of the firebox.
10. Steam gages must be tested immediately before hydraulic pressure is applied, and must be tested at least once in three months thereafter.
11. These regulations supersede all regulations heretofore made by the Board.

That the hydrostatic test is a convenient method of testing the tightness of the work on a new boiler cannot be gainsaid, and hence its almost universal adoption, in conjunction with inspection to a greater or lesser degree, in the passing of new work. As a detector of leakages it has at least no rival, and its application enables faulty caulking to be made good before the boiler has left the works, and before a leak has time to enter on its insidious career of corrosion. It will be evident that if the test be applied with this object to a new boiler, the pressure should range to some point in excess of the working load if such a test is to be of any practical value.

The foregoing has dealt with the testing of new work. If such stringent means must be taken to insure a good substantial boiler, we ought to be willing to confess that it is necessary to repeat this operation at least once each year, as a locomotive boiler does not get any younger, but older and consequently weaker. A periodical test at a

\*A paper read at the September meeting of the Central Railway Club.

pressure of at least 25 per cent. above the working load is necessary and practicable.

Mr. West (N. Y., O. & W.).—Reports of the Hartford Insurance Company deal almost exclusively with stationary and other than locomotive boilers, and I do not believe any such percentages of defects would be found if the inspection were made on locomotive boilers. I am not in favor of increasing the hydrostatic pressure to any such percentage as is advocated by Mr. Wagstaff. I do not believe any man who has watched the hydrostatic pressure would find the defects in the same place as when tested by steam and I do not believe that the strains or expansions of boilers which are due to a hydrostatic pressure have anything to do with a steam pressure. We test our boilers two and three times; first, with a hydrostatic pressure; and frequently we will find 15, 20 and as high as 40 broken stay-bolts after they are fired up. The boilers do not expand the same with cold water or even with warm water as they do under the high pressure of steam. I believe 25 lbs. above the working pressure is sufficient and covers the requirements of any law with any sense.

Mr. Ball (Lake Shore).—Mr. West lays too much stress on the ill effects that might result from hydrostatic pressures, even by going up as high as 25 per cent. of the boiler pressure carrying capacity. The boilers that we are designing to-day have a factor of safety of from 4 to 5. Our boilers I believe have  $4\frac{1}{2}$ . Within the elastic limit of the material you could very easily subject the boiler to a pressure of 25 per cent. in excess of the working pressure and not strain the materials anywhere near the elastic limit. It may be that 25 lbs. in excess of the working pressure is sufficient, but I really do not believe there would be any harm or detriment to the boiler from using 25 per cent. if thought desirable.

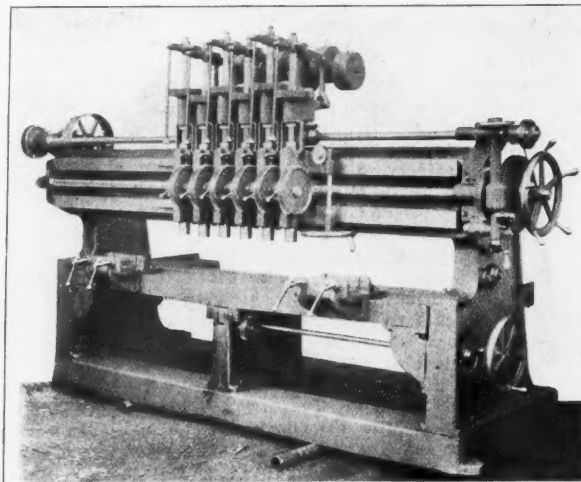
Mr. James (Lehigh Valley).—It seems to me that 25 per cent. hydrostatic pressure over the working pressure should not materially injure a boiler. I feel, however, that for ordinary working conditions a test of 25 lbs. excess pressure is sufficient and in our testing of boilers we carry out that rule. A locomotive boiler on our road must be tested yearly. It must have all coverings removed, and when the test is made it is put under the closest scrutiny of the best boiler inspector we have. During the working of the locomotive the boiler is tested every month, and our system of records is such that if it is not done the question is asked, "why?" In the matter of stay-bolts, the question has been brought up of drilling a small hole as a matter of safety. I do not see myself why a hole  $\frac{3}{16}$  in. in diameter for a  $\frac{3}{4}$ -in. bolt or larger is too large. It does not materially reduce the factor of safety of that bolt. It is very important to have a certain sized hole in the bolt for the very reason that at times stay-bolts will break. They break so slowly and so insidiously that if the hole is small the sediment fills up faster than it has a chance to show. I think that is why a hole of  $\frac{3}{16}$  in. diameter is considered small enough and safe enough for a drilled bolt. As to the question of not testing drilled stay-bolts, I cannot agree with that. I think that all bolts in a boiler, whether they are drilled or not, should stand a stated periodical inspection. In my experience I have seen drilled bolts that have been stopped up through using bad water or other condition. If a bolt is drilled, it is a very good safeguard, although it is not always a sign because it does not leak, that it is not broken. We cannot pay too much attention to our locomotive boilers as they are working under present conditions. Years ago a boiler was worked about one-third of its time, the other two-thirds remaining in the house simply under low pressure, but to-day our locomotives are working 18 hours or more of the 24. The life of a boiler, therefore, under present conditions, will not exceed probably one-third what it did a number of years ago.

Mr. Williams (D., L. & W.).—In building locomotive boilers it is of the greatest importance that we use care in getting the seams properly fitted together and the holes true—good rivets, good boiler plate, and good workmanship are the things that go to make up a first-class boiler. After we get the boiler together it is equally important to make the test. Twenty-five per cent. above the working pressure is what I would call a very moderate test pressure for a new boiler. After the boiler is put in use it begins to grow old at once. It begins to depreciate in strength, not very fast, of course, but nevertheless it begins to depreciate and the extent of depreciation each year depends a great deal on the care that the boiler received while in the hands of the boilermakers and the engine and engine-house men. After a boiler gets to be say ten years old I think it is more necessary to test it with a hydraulic test and even more necessary to increase that test pressure above what it would require when the boiler was new. The older the boiler gets the more liable it is to show weakness and as that liability increases the test should be given more systematically and if anything a little greater pressure used. It might be possible that a seam would be depreciated in strength to within 18 per cent. above the working pressure. If it was, the 25 per cent. excess would develop the weakness. Braces might be cracked and broken within pretty close to the strength required to stand the

working pressure. The 25 per cent. increase would break them entirely off and the weakness would be discovered. A large number of stay-bolts in a group might be fractured nearly through and not be discovered by the boilermaker in the hammer test and if fractured below the 25 per cent. excess limit, the test pressure would crack them entirely off. It is customary with us, after the hydraulic pressure is put on and completed, to have the boilermaker's hammer test given the stay-bolts again, to see if any of them have broken entirely off during the test; also test the braces as far as we can in the boiler head. On the Minneapolis & St. Louis we used 40 per cent. in excess of working pressure and thought that was none too great. That, I believe, is the government requirement. We had one boiler give away in the gusset sheet during the test. I think that was due to the fact that we were testing then with cold water and I do not think it would have given away if we were testing with warm water, but the fact that it gave away showed the weakness of the construction of the boiler, and we removed the old sheets and applied new sheets to the four boilers which we had of that type, which were built at the same time. I would recommend that the 25 per cent. be the minimum limit we use and as the age of the boilers increases we should test them more frequently. Once a year is all right for a boiler from one to eight years old. They should be tested twice a year after that age.

#### A New Mud-Ring Drill.

We illustrate herewith a new mud-ring drill which the Bickford Drill and Tool Company, of Cincinnati, Ohio, are just placing on the market. The chief characteristic of this machine is that while it was designed especially for mud-ring drilling, it is equally well adapted to all operations of multiple drill work. Instead of the heads sliding on an auxiliary rail as in the ordinary construction they adjust directly on the main rail, which enables them to be spread to any desired center distance, each head being pro-



A New Design of Mud-Ring Drill Made by the Bickford Drill & Tool Company.

vided with independent adjustment. For mud-rings or other similar work, where it is desirable that the heads should adjust collectively, the heads are clamped together by means of two quick-acting nuts which fix the center distance between spindles at  $7\frac{1}{2}$  in., 8 in.,  $8\frac{1}{2}$  in. or 9 in., as may be required. A dial on the worm wheel in the upper corner of the right-hand head shows the distance through which the heads are moved to the right and left. The speed and feed changes are obtained by means of change gears which are held in position by spring plungers, thus enabling the operator to change quickly from one speed or feed to another without lessening the available power of the machine. A dial on the large worm-wheel at the right shows where to set the dog to trip the feed at any desired depth. The spindles are  $1\frac{13}{16}$  in. in diameter. They have a vertical movement of 12 in. and work to a maximum center distance of  $26\frac{1}{4}$  in. The table has a transverse movement of 24 in. and receives between housings with a 12-foot rail 10 ft. 6 in. Driven by a constant speed pulley the power is never less than that obtainable from a 5-in. double belt running at 1,696 f. p. m. The net weight of the machine is 17,500 lbs.

The management of the Italian Southern Railroad, which was not taken over by the state with the other Italian lines, asks for bids from all countries for supplying locomotives and passenger and freight cars to the amount of about \$10,000,000.







# GENERAL NEWS SECTION

## NOTES.

The Erie Canal is to be closed November 28.

According to a press despatch the Denver & Rio Grande is to have ticket collectors on its passenger trains.

At Marengo, Iowa, November 9, Eric von Kutzben was sentenced to imprisonment for life for maliciously derailing a passenger train of the Chicago, Rock Island & Pacific at Homestead, Iowa, on the 21st of March last.

A press despatch from Winnipeg says that the Canadian Pacific is to carry 2,000,000 bushels of wheat by rail from Fort William to St. John, N. B. The wheat is to furnish the loads for the first sailings from St. John of the Canadian Pacific transatlantic steamers.

The Railroad Commission of Georgia has taken measures to recover in the courts the legal penalties against the Louisville & Nashville for failure to obey an order to put up a station building at Blackwells and failure to furnish certain information asked for by the Commission.

The Railroad Y. M. C. A. in the yard of the Pere Marquette road at Grand Rapids, Mich., will soon have a new building, the last contracts having just been let. The building is to cost \$15,000 and a good share of the first cost and of the running expenses will be borne by the Pere Marquette Railroad Company.

Two new ferryboats for the Central Railroad of New Jersey were launched at the yards of the Harlan & Hollingsworth Company, Wilmington, Del., November 11. The boats were christened "Cranford" and "Somerville," and are identical in every respect. They are of the double screw, double deck type, with landings from each deck. The hulls are entirely of steel and are divided by five water-tight compartments.

The Supreme Court of the United States on November 13 reversed the decision of the Kentucky Court of Appeals in the case of the Union Refrigerator Transit Company vs. the Commonwealth of Kentucky, and held that the cars owned by the company and used in other states cannot be taxed in that state, even though it be a Kentucky corporation. The opinion of the court was delivered by Justice Brown.

The Los Angeles *Examiner* reports the total shipments of citrus fruits eastward from southern California for the year ending October 31, as follows: Oranges, 25,553 cars; lemons, 4,336 cars. From northern California there were 1,835 cars of oranges, making a total from California of 31,725 cars, an increase of 2,104 cars over the preceding year. According to the same authority the number of cars of oranges sent north from Florida this year has been 7,500.

A public spirited citizen of Camden, N. J., offers a prize of a thousand-dollar death-benefit certificate in a fraternal insurance organization to the conductor of the Camden & Suburban Street Railroad who secures the best record of good conduct and courteous attention to passengers, and a similar prize to the most efficient motorman. The marking of the conductors and motormen is to be entrusted to a committee selected from among passengers who regularly ride on the cars.

The Railroad Commission of Georgia, basing its decision on numerous inquiries and complaints, has ordered that after the first of May next, no railroad shall be allowed to collect freight charges based on a weight which depends on the marked weight of an empty car, unless the car has been weighed since November 1. In other words, all cars must be reweighed within the next six months. The weighing must be done by a sworn weigher, and he must send his sworn certificates for all cars to the office of the commission.

The Railroad Young Men's Christian Associations along the line of the Buffalo, Rochester & Pittsburg now have an educational director who attends to that department of the work at the three principal points on the company's lines—Buffalo, DuBois and Salamanca Junction. President Yates, of the railroad company, writing recently in commendation of the work of the Y. M. C. A., said that his company had contributed to it during the past year about \$30,000, in addition to ordinary expenses, this sum having been appropriated chiefly for important additions to the Y. M. C. A. buildings at the places above named.

For the delegates attending the recent "Interstate Commerce Law" convention, at Chicago, a special round trip rate was requested, and the railroads agreed to carry them home at one-third

fare, provided 100 delegates asked for the reduction; but, although about 900 persons attended the regular and the "rump" conventions, only 91 asked for the special rate. On this state of facts a Chicago reporter concludes that the other 809 rode on passes. As, presumably, the reduced rate did not apply on tickets for short distances, the reporter's conclusion does not by any means follow; but it will amuse his readers—especially with his scare head "FOES OF RAILROADS TRAVEL ON PASSES."

The Attorney-General of the United States has brought suit in the Federal Court in Wisconsin, Eastern District, to test the legality of commissions paid by railroads to refrigerator car companies. The suit is against the Pere Marquette, the M., K. & T., the Wisconsin Central and other roads, the Milwaukee Refrigerator Transit Company and the Pabst Brewing Company. The refrigerator car company is owned by stockholders of the brewing company and controls shipments from the brewery; and the railroads have paid the refrigerator company 12 per cent. commission on shipments of beer in the refrigerator company's cars. This percentage, apparently, is in addition to the regular mileage paid for the use of the cars. The suit is brought under that clause of the law which makes it unlawful, by any device whatever, to carry freight at less than the published tariff rate.

At Washington last Monday representatives of the railroad labor unions called on President Roosevelt to protest against freight rate legislation. There were representatives of five of the brotherhoods, the engineers, firemen, conductors, switchmen and trainmen. They averred that rate legislation logically meant the lowering of rates. This they contended would be followed by a lessening of the earning power of railroads and, consequently, by reduction of wages. George Huntley, of the conductors' organization, was the chief speaker. He assured the President that no taint of partisanship or political coloring existed in any degree among the remonstrants. In response President Roosevelt assured the delegation that it was not his purpose or the purpose of those who favored railroad rate regulation to do anything that might injure the railroads of the country or incidentally the employees of the railroads. He said that it was his purpose that all classes—railroads, shippers and employees—should have perfectly fair treatment. He was of the opinion that the proposed legislation would not necessarily mean a reduction in rates; discrimination was the main thing aimed at. Those who had complained to the President had in some cases charged discrimination not only by rates that were too high but by rates (made to favor some big shipper) that were too low.

## Decreased Personal Injury Damages in Texas.

From a statement of the auditor of the Texas Railroad Commission printed in the *Galveston News* it appears that in the last fiscal year the railroads of Texas paid out for damages on account of persons killed and injured 27 per cent. less than in the year preceding—which encourages the belief that the efforts of Mr. Markham and others to expose and kill off the outrageous "damage-suit industry" of the state, have had good effect. The principal figures in the statement are:

Payments made on account of injuries to persons by Texas railroad companies:

Name of railroad.	Year ended June 30, 1904.	1905.
Galveston, Harrisburg & San Antonio.....	\$311,760	\$188,515
Gulf, Colorado & Santa Fe.....	217,330	164,907
Houston & Texas Central.....	122,049	83,388
International & Great Northern.....	153,259	175,058
Missouri, Kansas & Texas Ry. of Texas.....	308,889	208,718
Texas & New Orleans.....	191,940	82,745
Texas & Pacific (in Texas).....	138,313	106,948

Total, including these and 45 other roads.....\$1,873,793 \$1,368,583

## Combination of European Makers of Railroad Equipment.

The Arthur Koppel Co. and Orenstein & Koppel, both of Berlin, Germany, which are two of the largest makers of complete railroad equipments in the world, have formulated a working agreement which practically amounts to a consolidation and hereafter will conduct their combined business in all parts of the world under one management. Both companies make and sell all kinds of railroad equipment for broad, standard and narrow gage roads, including track and switches, ties, locomotives, cars, etc., of every type. The Arthur Koppel Co. has six works in Europe and two subsidiary companies' works in Russia. About 75 district sales offices are established in all parts of the world. Orenstein & Koppel have large works in Berlin and a large number of branch sales offices in Europe and Asia. The combined capital of the two companies is 17,000,000 marks. In this country the consolidated sales will be handled through the New York office of the Arthur Koppel Co.,



which will be in charge of Louis H. Abenheimer and Robert Lindenthal, General Managers. Mr. Abenheimer was formerly in charge of the Egyptian branch of the company and Mr. Lindenthal has been for some years in charge of the local office.

#### British Thomson-Houston Contracts.

The British Thomson-Houston Company, Limited, which is controlled by and represents the British interests of the General Electric Company of New York, has been awarded the contract for the motor equipments to be installed on the trains to be operated by the Great Western Railway Company and the Metropolitan Railway Company on the new Hammersmith and City line, London. There will be 20 trains in all. Each will have six coaches. The B. T.-H. type G. E. 76 motors will be used. The Sprague-Thomson system of control will also be employed. The value of the contract is about \$750,000.

#### A "Passive" Strike in Austria.

Press despatches of November 10 report that the employees of the railroads of Austria have begun a "passive" strike, such as that which occurred in Italy a few months since. The strikers do not leave their work, but they endeavor to carry out the requirements of their regulations so strictly as to greatly impede the traffic.

#### Coaling Stations for the Pennsylvania.

The Pennsylvania is building coaling stations at Thorndale, on the Philadelphia division, and at Denholm, on the middle division. The stations are to coal and water six locomotives at one time. Parallel tracks for six trains are being laid.

#### Still Appropriate.

Little Willie—"Papa, why does the railroad company have those cases with the axe and saw in every car?" Father—"I presume they are put in to use in case any one wants to open a window."—*Puck*.

#### New Automatic Signals on the Reading.

The Philadelphia & Reading is equipping with Hall automatic disk block signals (normal danger) its double-track line between Harrisburg, Pa., and Shippensburg, 41 miles; also certain double-track sections on other divisions, making in all 50 miles of automatic block signaling, double-track.

#### Some Rapid Machine Calculations.

In the second annual Office Appliance and Business System Show, Madison Square Garden, New York City, October 28 to November 4, 1905, there was a series of adding machine and calculating machine contests which produced some surprising results in the way of speed and accuracy in machine calculation. Miss May Maher, an operator in the offices of the Chicago, Burlington & Quincy Railroad, Chicago, added 500 items, each on a separate piece of paper, and handled the papers, in 4 min. and 19 sec. Miss Mae Barclay, with the Illinois Central, Chicago, performed the same task in 4 min. and 21 sec.; and Miss Ollie Crow, also of the Illinois Central, did the same thing in 4 min. and 28 sec. Each of the three was accurate, and beat the world's record for rapid addition which previously was held by Miss Annie Maloney, of Marshall Field & Co., Chicago, who made the time of 4 min. and 55 sec. at the Coliseum, Chicago, in March, 1905. The machine used by all of the winners in both of these tests, which were open to all makes of machines, was the "Comptometer," made by Felt & Tarrant Manufacturing Co., Chicago.

In another contest at Madison Square Garden, also open to all makes of machines, 25 multiplications were performed by Miss Thea E. Swanson with Swift & Co., Chicago, in 2 min. and 5 sec. The second prize in this contest was won by Miss Caroline Engl, of the Western Electric Company, New York, in 2 min. and 18 sec. The multiplication examples averaged four places by three places, as 1637 x 374. There were four contestants, the slowest time being 2 min. 35 sec. The prize winners obtaining these remarkable results in both adding and multiplying contests used the "Comptometer."

#### The Mexican Car & Foundry Company.

The Mexican Car & Foundry Company, which has within the last few days put in operation a good sized plant in the vicinity of Mexico City for the building of railroad cars, has secured some contracts from railroads in the Southern Republic. The San Rafael & Atlixco has ordered 50 freight and four passenger cars, and the Chihuahua & Pacific have ordered a baggage car. These contracts call for deliveries inside of 90 days. The Mexican Car & Foundry Company was organized about two years ago by Isaac M. Hutchison, of Mexico City, who represents the interests of the American Locomotive company, the Niles-Bement-Pond Company, the Chicago Pneumatic Tool Company and other prominent North American manufacturing concerns. Mr. Hutchison is president of the company, whose stock is understood to be largely held in the states. Robert J. Gross, one of the Vice-Presidents of the American Locomotive Company, has just been elected a director of the Mexican

company. It is officially stated, however, that the American Locomotive Company is not identified with the enterprise.

#### A New Design of Mechanical Draft Fan.

In handling hot gases with a fan, as in an induced draft plant for boilers, the fan shaft cannot be given a suitable bearing at the inlet side, as it would be constantly surrounded by hot flue gases. The best practice has been to use an over-hung wheel, having in addition to the two engine bearings, a bearing on the engine side of the fan, but none on the inlet side. This construction, though, gives



Fig. 1—A New Design of Mechanical Draft Fan.

trouble through difficulty in lining up this bearing with the two engine bearings. Fig. 1 shows a method lately adopted for overcoming this trouble. All three journal boxes are cast in the engine frame and can be bored with the same boring bar, assuring perfect alignment. This also avoids the need of a self-aligning bearing, simplifying the arrangement. The bearing being supported by the engine bed instead of by the fan housing further simplifies the construction by doing away with the additional bracing which would otherwise be required. The wheel (Fig. 2) has some new features of construction. Instead of three spiders there is one heavier one, built of I beams cast into the hub. The blades are braced upon each other. It is claimed that this construction is as strong and rigid as the three-spider form. The use of a single spider obviates the necessity for more than one hub on the shaft. This concentrates the load



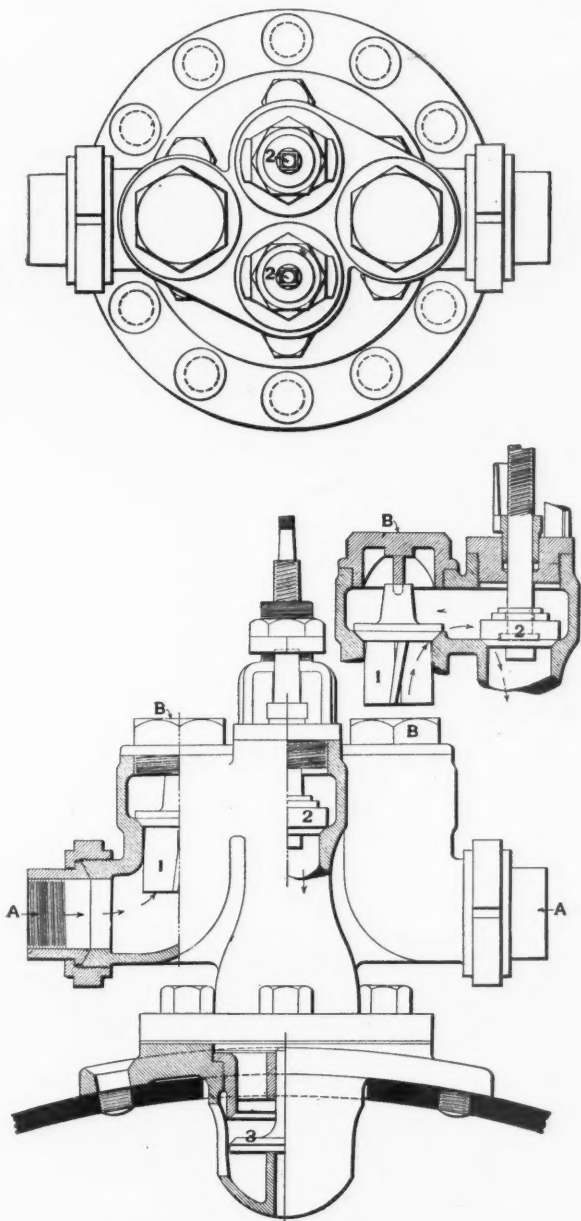
Fig. 2—Wheel for New Design of Mechanical Draft Fan.

of the wheel upon a comparatively short length of shaft. Also, the deep cone in the casing and the position of the fan bearing brings the load of the fan quite near to the fan housing; in fact, the bearing is included within the width of the fan blades. This point is claimed to be of considerable importance, since, with the three-spindle design of fan the center of gravity would be some distance out from the bearing and there would be a tendency of the shaft to move on the fan bearing as a fulcrum and cause an upward thrust in the engine and on the engine journal caps. With the single spider this trouble is not experienced. The engine is of the enclosed type, oiled by a specially devised pump which distributes quantities of oil over the reciprocating and revolving parts, including the eccentric outside of the frame. It is claimed that tests in practice have shown that the engine will run several months with-

out oiling or adjustment. These fans are made by the American Blower Co., Detroit, Mich.

#### The Phillips Double Boiler Check Valve.

The Phillips double boiler check valve is illustrated herewith. It unites the customary right and left check valves in a single device. Taking up one side, the feed pipe from the injector is attached at A, the path of the water through the valve being indi-



The Phillips Double Boiler Check Valve.

cated by arrows. Valve 1 is raised from the seat by the water, which passes through the opening at valve 2, the latter normally being left open. Valve 3 is a safety valve, to prevent the escape of boiler water or steam in case of an accident to the part of the device about the boiler shell. Should check valve 1 get out of order or need regulating, valve 2 is closed and cap B removed, permitting valve 1 to be examined and the seat reground if necessary. The valves 2-2 for the two sides are independent so that pressure may be shut off on either side, as desired.

The valve is placed on top of the boiler and is thus removed from the scale or mud that may be in the boiler. The valve is made principally of brass. The saddle base is cast iron and a copper gasket is used in the joint between it and the upper part. There are about 500 of these check valves now in use, and the makers have some strong testimonials from users regarding their merits.

The valve was invented by Mr. C. Phillips, Master Mechanic of the Queen & Crescent at Meridian, Miss. It is sold by Jas. E. Minor, 92 Liberty street, New York. There are two styles, F and G, the latter being the one illustrated.

#### The Recent History of Federal Control of Railroads in the United States.\*

BY W. M. ACWORTH.

To attempt to compress within an hour's lecture the recent history of Federal control of railroads in the United States is, I fear, really to attempt to squeeze into a pint pot not merely a quart but a whole barrel. And the more so because, in speaking to an English audience, it is necessary to begin by describing the limitations of the American constitution and distinguishing between state and Federal rights.

We in England know Parliament as a body, in the words of the Bidding Prayer, "over all persons and over all causes within these dominions supreme." Our Parliament might next session repeal the Habeas Corpus Act, abolish trial by jury, confiscate all the land in the country, or do any other impossible thing that it thought fit. There is no redress and no appeal except to a revolution. The highest law court in the land has only to interpret what an Act says. If once its meaning is clear the court has only to enforce the Act, be it ever so repugnant to common honesty or common morality.

In the United States there is no supreme authority. And this for two reasons. In the first place the United States consist of 45 several states, each of which is supreme within its own sphere. And that sphere is a pretty wide one. For example, one state might hang a man for pocket-picking, while the adjoining state might abolish capital punishment altogether. For another example, in some states marriage is, I believe, indissoluble; in others you can get a divorce for incompatibility of temper at a few days' notice. The Federal Government has no power to deal with any matters except such as have been voluntarily assigned to it by the several states. The whole power of the Federal Government to control railroads comes from two lines in the constitution of the United States which declare that the states delegate to Congress "power to regulate commerce with foreign nations and among the several states and with the Indian tribes." The last function is less important nowadays than it was when the constitution was framed.

The second reason why there is no supreme authority in America is this. The Americans have, what we have not, a written constitution, or rather 46 written constitutions, the Federal Constitution and the constitutions of each separate state. The constitution, Federal or state, is the fundamental law and cannot be altered except by very deliberate and exceptional procedure. Till it is altered, the constitution—Federal or state, as the case may be—overrides all laws, which may be passed by the legislatures whether Federal or state. If an Act of Congress or of a state legislature is claimed to be unconstitutional, the courts are appealed to, and if they decide in favor of the claim the law is no law and any citizen may disobey it with impunity. For example, Congress some years ago passed an Act imposing an income tax on all incomes above a certain amount. The Supreme Court of the United States decided that this tax was illegal as contravening a provision of the Federal Constitution that all taxation should be equal. American legislatures then can only pass laws subject to their not being repugnant to the constitution as interpreted by a law-court.

One point more. The constitution provides for a separation of power into three parts, judicial, legislative and executive—executive or judicial functions cannot be given to or assumed by Congress, the President cannot exercise legislative or judicial functions, a law-court cannot act in a legislative or executive capacity. To take a specific instance. Our Parliament a year or two back enacted that the London Water Companies should sell their property to the Metropolitan Water Board at such a price as should be fixed by three arbitrators, only one of whom was a lawyer. Such an Act would be unconstitutional in America. No man can be deprived of his property "without due process of law" which has been decided to mean without the right to appeal to a regular law-court. In listening therefore to what I have to say as to the regulation of railroads by the Federal Government in America, I ask you to keep constantly before your minds (1) the existence of the double authority state and Federal; (2) the existence of a supreme and practically almost unchangeable law, the written constitution; and (3) the impassable line of demarcation between legislative, judicial and executive functions.

Railroad regulation in America naturally began with the several states. The railroad company obtained its charter—as we should say, its Act—from the legislature of the state in which it was situated. Such control over its rates, its method of construction and operation, its taking of land, its employment of servants and so forth, as was exercised, was exercised by the individual state. And if a railroad company confines its operation to a single state it still remains subject to that state and that state only. No legislation of Congress has power to affect it. But the moment it engages in interstate commerce—and this practically every railroad

\*A lecture delivered on Oct. 25, at the School of Economics, University of London.

company does, for even if its own lines do not cross the frontier of the state in which it is domiciled, it exchanges traffic with other companies whose lines do cross that boundary—that moment it becomes subject to the Federal power to regulate commerce among the several states. Speaking broadly we may say that at the outset railroads were local concerns, regulated by the state; they have become national concerns and the problem of their regulation has become a national, that is Federal, matter.

The early state regulation was usually of a very slight and perfunctory kind. Everyone was much too anxious to get a railroad to dream of discouraging enterprise by so much as mentioning the word restriction. Sometimes, but not, I think, usually, the original charters contained a schedule of maximum rates. Such schedules, even where they existed, became within a few years as obsolete as the powers to charge 6d. per ton-mile for coal which were in force on some lines in England till the year 1892. Supervision of construction was, as far as I know, unheard of. Regulations as to operation mainly concerned themselves with matters such as the lawfulness of running trains on the Sabbath day or the requirement that every train should stop at the state capital.

The period of state activity in railroad regulations began about 1865. Between that date and the end of the century a vast mass of state legislation was passed. Most of it was an exercise of what is known in America as "the police power," the power, that is assumed to be inherent in every government to protect the safety and provide for the wants of its citizens. For instance, every railroad company in the state might be required to run at least one passenger train each way daily, or trains might be required to come to a dead stop before reaching a grade crossing, a point, that is, where two lines intersect one another on the same level. [The non-railroad mind, even in England, has never been able to grasp the fact that a crossing at right angles is neither more nor less safe than an ordinary junction.]

But much more important than the direct action of the state legislatures was their indirect action. More than two-thirds of the states—including every important state with the single exception of Pennsylvania, almost the most important state of all—have appointed Railroad Commissions, bodies usually with three members, charged with the execution of the state railroad laws and the supervision of the railroads within the state. At one time, in the seventies, these commissions were of very great importance. At the present day, mainly owing to the fact that the great bulk of the traffic is interstate, and so exempt entirely from state control, their importance has relatively declined. But they continue to exist, as corporate organizations usually do, once they are brought into existence. Some of them, that of Massachusetts first and foremost, are eminently useful; some, that of Texas first and foremost, are eminently noxious; the majority, to use the American phrase, "cut no figure at all" in the matter of railroad regulation.

The 30 commissions fall into two broad groups, commonly distinguished as "strong" and "weak," or "commissions with power" and "commissions without power." For my own part, if I had to find a phrase, I would call them "commissions with power" and "commissions with powers." For the commissions with nominally large powers have undoubtedly in practice done far less good than the commissions with powers nominally so small as "hardly," in Mr. Charles Francis Adams words, "to seem worthy of the name" of power at all. But, as Mr. Adams points out, in his admirable little book, "Railway Problems," while the strong commissions mean "the constable," the weak commissions mean "public opinion"; and in a free and law-loving community public opinion is always in the long run a better disciplinarian than the constable. The type of the weak commission is that of Massachusetts, which—in matter of rates at least—can only inquire, report and recommend; of the strong commission that of Illinois, which can prescribe rates and issue definite orders.† It was, I think, necessary for me to give this very rough and brief sketch of state railroad regulation, in order that you might be in a position to understand the situation in which the Federal or national authority has intervened.

(To be continued.)

#### C. L. Rate on Cotton Permissive, Not Mandatory.

The Interstate Commerce Commission in an opinion by Chairman Knapp, Commissioner Prouty dissenting, has decided the case of the Planters' Compress Company against the Cleveland, Cincinnati, Chicago & St. Louis Railway Company and others, which involves the rates on round-bale and square-bale cotton. Cotton is transported by defendants and carriers generally at the same rate per 100 lbs., whether shipments are made by the carload or in less quantities. The usual shipment weighs about 25,000 lbs., when the common method of square-bale compression is used, though considerably more might be loaded in an ordinary car. The round-bale process permits the shipment of 45,000 lbs. or more per car, and complainant wanted lower rates on a carload minimum of 45,000 lbs.

†Some of the strong commissions fix maximum rates; some actual rates which the railroads are required to charge. The importance of the distinction is more theoretical than practical. For the maxima tend to be fixed at a point below which the railroad companies have no desire to go.

The high carload minimum could not be complied with by shippers using the square-bale process without considerable difficulty and greater expense. The cotton grower would benefit by a general reduction of cotton rates, but no advantage would result to either the cotton grower or the middleman from such a differential, and complainant's proposal would not advance the interests of the public. After considering all the conditions and circumstances, including the effect of the proposed differential upon carriers from producing territory as well as on the defendants, the Commission decides as follows:

If the rate on an article is reasonable, to those who ship the great bulk of that article, in the form in which it is commonly prepared for transportation, that rate does not become unreasonable to the shipper of a small quantity of the same article merely because he chooses to prepare his shipments in a form which affords the carrier a greater profit per 100 lbs., particularly when the preparation of that article in the more profitable form would impose some degree of hardship upon a large majority of shippers because of its greater expense or for other reasons. While carriers may lawfully establish carload and less than carload rates on cotton, with a reasonable difference between the two rates and a reasonable carload minimum securing to shippers generally the lower carload rates, it does not follow that they are bound to do so, much less that they can be required to establish a differential based upon an unusual carload minimum. Defendants' refusal to grant lower rates on cotton in carloads of 45,000 lbs. or more is held not to be a violation of the regulating statute.

#### Erie Railroad Monument at Deposit, N. Y.

On Friday, November 10th, there was dedicated at Deposit, N. Y., a handsome granite monument to commemorate the first breaking of ground for the construction of the Erie Railroad, which occurred 70 years ago. The dedication drew a considerable company of people and there was music by a chorus of 250 voices. Addresses were made by James T. Rogers, of Binghamton; John B. Stanchfield, of Elmira, and the Assistant General Traffic Manager of the road, Mr. D. W. Cooke. The inscription on the monument reads:

Here, on the morning of  
November 7, 1835,  
Ground was broken for the  
Construction of the Erie Railroad,  
Designed to connect  
the Atlantic Ocean with the Great Lakes.

Its completion to Lake Erie was  
publicly celebrated in New York  
and along the route to Dunkirk,  
May 14, 15, 16, 1851.

#### Manufacturing and Business.

The Dominion Bridge Co., of Montreal, it is said, has decided to open a branch factory in Winnipeg, and shops will be put up early next year.

Robert McF. Doble, Consulting Engineer, of San Francisco, has severed his connection with the Abner Doble Company in order to resume his private practice.

The Duff Manufacturing Company, Pittsburg, Pa., was awarded the gold medal, highest award, on the Barrett track and car jacks at the Lewis and Clark Exposition, Portland, Oregon.

Eugene Klapp, who recently resigned as Chief Engineer of the Brooklyn Rapid Transit Co., did so in order to enter into partnership with Mr. William Barclay Parsons, Consulting Engineer, at 60 Wall street, New York City.

F. E. Baxter, heretofore Division Engineer at Salt Lake City, of the Rio Grande Western, has become Vice-President and General Manager of the Baxter, Straw & Storrs Construction Co., general railroad contractors, of Salt Lake City, Utah.

Bids are wanted November 21 by Alfred Anderson, Assistant Purchasing Agent of the Panama Railroad Co., 24 State street, New York, for furnishing semaphores for the Panama Railroad, as mentioned in advertising columns on page 22 of this issue.

The Damascus Bronze Co., Pittsburg, Pa., has shipped a carload of material to Japan consisting of babbitt metal and Damascus nickel bronze bearing metal. This is the second export order they have had within the past two months; the first order going to Korea.

At a meeting of the directors of the Taylor Iron & Steel Co. held in New York on October 31, the following officers were elected: President, Robert E. Jennings; Vice-Presidents, Percival Chrystie and Dr. Henry M. Howe; Secretary and Treasurer, T. F. Budlong; General Manager, Knox Taylor.

The Boston Elevated is to replace its present economizers by large machines of special construction made by the B. F. Sturtevant Co., Boston, Mass. Two of these will be installed at the central



power station on Albany street, and the third at the East Somerville power station.

The De La Vergne Machine Company, New York, has received a contract for three 500 h.p. Koerting gas engines to be direct connected to three 325 k.w., 550-volt direct current Crocker-Wheeler generators for the Boston Elevated Railway Company. These engines will be put in operation about Jan. 1, 1906.

Henry F. Shaw, of Boston, well-known in railroad circles for his devotion to the problem of balancing the reciprocating parts of locomotives, has presented to Purdue University a model locomotive embodying his latest design. The model is constructed on the scale of 1 in. to the foot, and is an excellent piece of work.

A large order for freight elevators was recently closed through the Pittsburg office of the Otis Elevator Company for a single installation of 44 freight elevators in the new building of the Pittsburg Terminal Warehouse Company of Pittsburg, Pa. These elevators have a lifting capacity of 6,000 lbs. and a car travel of about 100 feet.

W. W. Butler, Second Vice-President of the Simplex Railway Appliance Company, has been elected Second Vice-President of the American Steel Foundries, to fill the vacancy caused by the resignation of W. D. Sargent, of New York. Mr. Sargent continues a director, having served on the board since the organization of the company.

G. E. Pellissier, formerly Civil Engineer in charge of construction of the Holyoke Street Railway Co., has taken a position with the Goldschmidt Thermit Company. He will inspect and report on street railway work in connection with the Thermit welded joint, and steam railroad work in connection with locomotive frame welding and welding of driving wheel centers.

The Public Works Department of Argentina, South America, now has under consideration work involving an expenditure of about \$78,000,000. The principal items include: Railroads, \$21,631,558; dredging, \$5,841,000; bridges and roads, \$8,871,000, and other improvements. The government has recently authorized the Entre Rios Railways Co. to extend its line to Buenos Ayres, crossing the Panama river by means of steam ferries. Quesada Bros. has also been authorized to build an electric line from Buenos Ayres to Lujan, and the government will build a railroad from Cerrillos to Rosario at a cost of \$520,000. C. B. Madero will extend the electric street line from Riachuelo to Lanus or Banfield.

#### MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

##### Central Railway Club.

At the regular meeting of this club in Buffalo November 10, there was a paper on "Railroad Accidents" by J. B. Morford, of the Michigan Central, and one on "Fuel Combustion" by G. F. Dillon, of the Scranton Correspondence Schools.

##### Maintenance of Way Master Painters.

The Association of Maintenance of Way Master Painters of the United States and Canada held its second annual convention in Cincinnati, Ohio, November 14 and 15. Papers on the following subjects were read: "Best Interior Natural Finish for Georgia Pine," by W. S. Hopkins (G. C. & S. F.), and F. E. Holpeter, Detroit Union Station; "Best Method of Accounting for Labor and Material," by J. S. Rice (L. S. & M. S.); "Material for Painting Stations Where Soft Coal is Burned," by Richard Beynan; "Best Method of Removing Dirt and Rust from Iron Bridges," by C. J. Bogardus (Erie); "The Best Guide in Selecting a Bridge Paint," by W. B. Parker. The Secretary of the Association is H. J. Schnell, 100 William street, New York.

##### American Society of Mechanical Engineers.

The fifty-second meeting of this society will be held in the Edison Building, 44 West Twenty-seventh street, New York, December 5, 6, 7 and 8. At the opening session President John R. Freeman will present the annual address. The next day a business meeting will be held in the main saloon of the steamship "Amerika" at the docks of the Hamburg-American Line at Hoboken, N. J., after which a visit will be made to the new Henry R. Worthington hydraulic works at Harrison, N. J. In the evening there will be an illustrated lecture on "Photography of Invisible Phenomena" by Prof. R. W. Wood, of Johns Hopkins University. Thursday morning, at West Twenty-seventh street, a number of papers will be presented, followed by a discussion on the subject of "Bearings," and in the afternoon there will be a reception at the New York School of Automobile Engineers, 46 West Fifty-sixth street. The usual reception will be held at Sherry's in the evening. At the closing session on Friday morning, professional papers will be presented.

#### PERSONAL.

—Mr. H. W. McMaster, General Superintendent of the Wheeling & Lake Erie, was born in 1860.



H. W. McMaster.

His first railroad service was at the age of thirteen as an operator on the Detroit, Lansing & Northern. Here he remained five years and then went to the Grand Rapids & Indiana with the same position, later becoming train despatcher. In 1882, he went to the Chicago & North-Western as train despatcher and remained there two years; he then became chief train despatcher on the Union Pacific and was soon promoted to be trainmaster on the same road. In 1889, he went to the Northern Pacific as chief train despatcher and was later trainmaster, holding that position until 1900. At that date he went to the Wheeling & Lake Erie and was Assistant Superintendent and Superintendent of that road and of the Wabash-Pittsburg Terminal until appointed to his present position.

—Mr. E. A. Williams, who was recently appointed General Mechanical Superintendent of the Erie and of its affiliated and controlled lines, entered railroad service as a machinist's apprentice on the Milwaukee & Prairie du Chien in 1865. In 1877 he went to the Chicago, Milwaukee & St. Paul as roundhouse foreman, and three years later became general foreman of the Southern Minnesota division. In 1886, he was appointed Assistant General Master Mechanic at Milwaukee, where he remained for four years, going at the end of that time to the Minneapolis, St. Paul & Sault Ste. Marie as Master Mechanic. He was made Mechanical Superintendent of that road in 1893 and in 1901 became Superintendent of Rolling Stock on the Canadian Pacific. In 1904, he went to the Erie as Assistant General Manager, where he has been until his recent promotion.



E. A. Williams.

#### ELECTIONS AND APPOINTMENTS.

**Atlantic Coast Line.**—C. M. James, heretofore Acting Engineer of Roadway, has been appointed Engineer of Roadway, with office at Wilmington, N. C.

**Buffalo, Rochester & Pittsburg.**—W. H. Wilson, heretofore Master Mechanic of the Erie, at Susquehanna, Pa., has been appointed Superintendent of Motive Power of B. & P., with office at DuBois, Pa., succeeding E. E. Davis, resigned.

**Canadian Pacific.**—F. W. Cooper has been appointed Resident Engineer at London, Ont.

**Chicago & Eastern Illinois.**—W. S. Dawley, Engineer of Maintenance of Way, has been appointed Chief Engineer, with office at Chicago. R. H. Howard, Assistant Engineer of Maintenance of Way, succeeds Mr. Dawley, with office at Chicago.

**Chicago & North-Western.**—F. R. Moulton, Trainmaster at Bellevue, Iowa, has been appointed Superintendent of the Iowa & Minnesota division, with office at Mason City, Iowa, succeeding E. G. Schevenell, promoted.

**Chicago, Burlington & Quincy.**—O. L. Dickeson is now Assistant Superintendent of Transportation of the lines west of the Missouri river, with office at Omaha, Neb.

**Chicago Great Western.**—George Reith, Superintendent of Terminals at Oelwein, Iowa, has resigned. William Matthie succeeds Mr. Reith.

- Chicago, Rock Island & Pacific.**—J. B. Berry, Chief Engineer of the Union Pacific, has been appointed Chief Engineer of the Rock Island, with office at Chicago, succeeding W. L. Darling, resigned.
- Cincinnati, Hamilton & Dayton.**—D. W. Cooke, Assistant General Traffic Manager of the Erie, has been appointed to the same position on the Cincinnati, Hamilton & Dayton and the Pere Marquette, with office at New York. D. G. Edwards, Passenger Traffic Manager, has resigned and the office has been abolished. R. H. Wallace, General Passenger Agent of the Erie, has been appointed to the same position on the C., H. & D. See Erie.
- Luis Jackson has been appointed Industrial Commissioner of this road and of the Pere Marquette, with office at New York.
- Cleveland, Cincinnati, Chicago & St. Louis.**—P. H. Delano has been appointed Engineer in charge of construction on the Cincinnati division, with office at Middletown, Ohio.
- Copper Range.**—R. T. McKeever, General Manager, has been elected also Vice-President, with office at Boston, Mass.
- Dayton, Lebanon & Cincinnati.**—The joint receivership of C. A. Alderman and W. E. Moore has been terminated and W. E. Moore has been appointed sole receiver, with office at Lebanon, Ohio.
- Erie.**—S. P. Shane, Freight Traffic Manager, has been also appointed to the same position on the Cincinnati, Hamilton & Dayton, and his office has been moved from Chicago to New York. F. A. Wann, formerly Vice-President in charge of traffic of the Pere Marquette, has been appointed Freight Traffic Manager of the Erie, with office at Chicago. C. L. Thomas, General Freight Agent at Chicago, has been appointed Assistant Freight Traffic Manager of Lines West of Buffalo and Salamanca, and also to the same position on the C., H. & D. H. G. Krake has been appointed General Freight Agent of Lines West of Buffalo and Salamanca, with office at Chicago.
- H. H. Harrington, General Foreman at Susquehanna, Pa., has been appointed Master Mechanic at that point to succeed W. H. Wilson, resigned. (See Buffalo, Rochester & Pittsburgh.)
- Florida.**—W. T. Cosby has been appointed General Freight and Passenger Agent, with office at Live Oak, Fla.
- Galveston, Harrisburg & San Antonio.**—J. M. Lee has been appointed Superintendent of the San Antonio Branch division, with office at San Antonio, Tex.
- Grand Trunk Pacific.**—G. U. Ryley has been appointed Land Commissioner, with office at Montreal.
- Great Northern.**—J. H. O'Neill, Division Superintendent at Whitefish, Mont., has been appointed Acting Assistant General Superintendent of the Western district, with office at Spokane, Wash., succeeding H. A. Kennedy, promoted. Howard James has been appointed Director of Purchases, and S. B. Plechner, Purchasing Agent, both with office at St. Paul, Minn.
- Illinois Central.**—R. E. Gaut, Assistant Engineer of Bridges, has been appointed Engineer of Bridges, succeeding F. H. Bainbridge. H. H. Hadsall succeeds Mr. Gaut, both with offices at Chicago. These appointments apply also to the Yazoo & Mississippi Valley.
- Isthmian Canal Commission.**—W. G. Tubby, General Store Keeper of the Great Northern, has been appointed Superintendent of Construction of the Panama Canal.
- Kansas City Southern.**—J. F. Murphy, Superintendent of Terminals at Kansas City, has resigned.
- Lake Erie & Western.**—L. L. Hyde, heretofore General Agent at Chicago of the Lake Shore-Lackawanna Fast Freight Line, has been appointed Assistant General Freight Agent of the Lake Erie & Western, with office at Peoria, Ill., succeeding M. R. Maxwell.
- Licking River.**—The office of F. J. Pischel, Treasurer, has been removed from Farmers to Yale, Ky. J. A. Kauffman has been appointed General Manager, with office at Yale, succeeding E. R. Miller, resigned.
- Louisiana & Arkansas.**—J. H. Conlan, Superintendent, has resigned, and the office has been abolished. J. H. White is General Superintendent, with office at Stamps, Ark.
- Minneapolis & St. Louis.**—D. C. Noonan, Superintendent, has been appointed to the new office of General Superintendent in charge of transportation and equipment, with office at Minneapolis. E. D. Hogan, Trainmaster at Minneapolis, succeeds Mr. Noonan, with office at Minneapolis.
- Missouri, Oklahoma & Gulf.**—O. M. Sewell has been appointed General Superintendent in charge of operation and traffic, with office at Muskogee, Ind. T.
- Northern Central.**—Henry Tatnall, Fifth Vice-President of the Pennsylvania, has been elected also Treasurer of the Northern Central, succeeding A. W. Hendrix, deceased.
- Northern Pacific.**—G. S. Fernald, Commissioner of Taxes, has resigned. M. T. Sanders succeeds Mr. Fernald. (See Pullman.)
- Pere Marquette.**—A. Patriarche, General Traffic Manager, has been appointed Freight Traffic Manager. See Erie and Cincinnati, Hamilton & Dayton.
- Pullman.**—G. S. Fernald, heretofore Commissioner of Taxes of the Northern Pacific, has been appointed Assistant General Solicitor of the Pullman Co., with office at Chicago.
- Rio Grande Western.**—C. A. Blake, Assistant Engineer, has been appointed Division Engineer at Salt Lake City, succeeding F. E. Baxter, resigned.
- South & Western.**—G. A. Kent, Chief Engineer of this company and of the Lick Creek & Lake Erie and the Carolina Co., has been appointed Chief Engineer of the Coal Land department. M. J. Caples, General Manager, has assumed the duties of Chief Engineer in addition to his duties as General Manager. The following engineers are officers of the Lick Creek & Lake Erie and the Carolina Co. as well as the South & Western: W. A. Doane, Principal Assistant Engineer, with office at Bristol, Va.; W. A. Hankins, Principal Locating Engineer, with office at Bristol, Va.; A. W. Jones, Engineer of the First division, with office at Fink, Va.; William Palmer, Engineer of the Second division, with office at Clinchport, Va.; Ward Crosby, Engineer of the Third division, with office at Lovedale, Tenn.; C. L. Ruffin, Engineer of the Fourth division, with office at Erwin, Tenn.; C. O. Vandevanter, Engineer of the Fifth division, with office at Spruce Pine, N. C.; S. P. Daniel, Engineer of the Sixth division, with office at Rutherfordton, N. C.
- F. Powell has been appointed General Claim Agent of this road and of the Lick Creek & Lake Erie, the Crane's Nest Coal & Coke Co., the Dawson Coal & Coke Co., the Clinchfield Coal Co., and the Carolina Co., with office at Bristol, Va. He will also perform the duties of Right-of-Way Agent and such other duties as may be assigned to him.
- Trinity & Brazos Valley.**—S. M. Hudson, Auditor of the Fort Worth & Denver City, has been appointed also Auditor of the Trinity & Brazos Valley, with office at Cleburne, Tex., succeeding E. Hickman, resigned.
- Union Pacific.**—J. B. Berry, Chief Engineer, has resigned. R. L. Huntley, Principal Assistant Engineer, succeeds Mr. Berry, with office at Omaha, Neb. See Chicago, Rock Island & Pacific.
- Western Pacific.**—H. N. McCartney has been appointed Principal Assistant Engineer, with office at Sacramento, Cal. J. B. Wallace has been appointed Engineer of Right of Way, with office at Sacramento. John T. Williams has been appointed Engineer in charge of construction from San Francisco to Stockton, Cal., 65 miles, with office at Oakland, Cal., and is in temporary charge from Stockton to the Yuba river, 50 miles. Emery Oliver has been appointed Engineer in charge of construction from Oroville, Cal., to Spanish Creek, 60 miles, with office at Oroville, and is in temporary charge from the Yuba river to Oroville, 15 miles. Charles Harlowe has been appointed Engineer in charge of construction from Deephole to Elko, Nev., 180 miles, with office at Winnemucca, Nev.
- Wheeling & Lake Erie.**—C. C. Needham, Claim Agent, has been also appointed Real Estate and Tax Agent for the lines of this company and those of the Wabash-Pittsburg Terminal west of the Ohio river, with office at Canton, Ohio. Archibald Mackrell, Real Estate and Tax Agent of the Wabash-Pittsburg Terminal, has been also appointed Claim Agent for the lines east of the Ohio river, including the lines of the Pittsburg Railroad, Terminal & Coal Co., with office at Pittsburg, Pa.
- Yazoo & Mississippi Valley.**—See Illinois Central.

#### LOCOMOTIVE BUILDING.

- The Duluth & Iron Range** has ordered 10 locomotives from the American Locomotive Co.
- The Queen & Crescent** has ordered three locomotives from the American Locomotive Co.
- The Lake Shore & Michigan Southern** is reported in the market for about 70 locomotives.
- The Atlantic Coast Line** has ordered 20 locomotives from the Baldwin Locomotive Works.
- The New York Central Lines** have ordered 318 locomotives from the American Locomotive Co.
- The Norfolk & Western**, it is reported, is asking bids on 50 locomotives for 1906 delivery.

*The Chicago, Burlington & Quincy* has ordered 50 locomotives from the American Locomotive Co.

*The Delaware, Lackawanna & Western* will order 50 locomotives. The contract has practically been placed.

*The Pennsylvania* has placed an order with the Baldwin Locomotive Works for 250 locomotives to be built in 1906.

*The Intercolonial* has ordered some engines from the American Locomotive Co. at the Montreal shops. The number is given as 15.

*The Philadelphia & Reading*, as reported in our issue of November 10, has ordered 50 locomotives from the Baldwin Locomotive Works.

*The Minneapolis, St. Paul & Sault Ste. Marie* denies having ordered two locomotives from the American Locomotive Co., as reported in our issue of November 10.

*The Lehigh Valley*, as reported in our issue of November 3, has ordered 30 locomotives, 15 from the Baldwin Locomotive Works and 15 from the American Locomotive Co.

*The Western Maryland*, as reported in our issue of October 20, has ordered one 16-wheel Shay locomotive from the Lima Locomotive & Machine Co. This engine will weigh 330,000 lbs.; cylinders, 17 in. x 18 in.; diameter of drivers, 46 in.; extended wagon top boiler, with a working steam pressure of 200 lbs.; 310 charcoal iron National Tube Co.'s tubes, 2 in. in diameter x 18 ft. 5 in. long; firebox, 114 in. x 62 in.; grate area, 49 sq. ft.; water capacity, 8,000 gallons, and coal capacity, nine tons. The special equipment will include: Westinghouse air-brakes, open-hearth steel axles, Keasby & Mattison boiler lagging, American Brake-Shoe Co.'s brake-shoes, Tower couplers, Dressel headlights, Nathan injectors, U. S. piston and valve rod packing, Crosby safety valve, Leach sanding devices, Union Spring & Manufacturing Co.'s springs, Latrobe driving wheel tires and cast-steel wheel centers. This engine is for road service on the West Virginia division on a 3 per cent. grade between Hendrix and Thomas, a distance of 10 miles. The grade is on the western slope of the Allegheny Mountains on what is termed the Black Water branch of the Cheat river.

*The Kansas City, Mexico & Orient* has ordered three Allfree-Hubbell type (4-4-0) locomotives, three Allfree-Hubbell type (2-6-0) locomotives and four Allfree-Hubbell type (2-8-0) locomotives from the American Locomotive Co., for November and December delivery. The 4-4-0 locomotives will weigh 123,500 lbs., with 84,500 lbs. on the drivers; cylinders, 19 in. x 26 in.; diameter of drivers, 69 in.; wagon top boilers, with a working steam pressure of 200 lbs.; tank capacity, 7,000 gallons of water, and coal capacity, 12 tons. The 2-6-0 locomotives will weigh 165,000 lbs., with 143,000 lbs. on the drivers; cylinders, 20 in. x 28 in.; diameter of drivers, 63 in.; wagon top boiler, with a working steam pressure of 200 lbs.; tank capacity, 7,000 gallons of water, and coal capacity, 14 tons. Two of the 2-8-0 locomotives will weigh 200,000 lbs., with 180,000 lbs. on the drivers; cylinders, 23 in. x 30 in.; the other two 2-8-0 locomotives will weigh 180,000 lbs., with 160,000 lbs. on the drivers; cylinders, 22 in. x 30 in.; all 2-8-0 locomotives will have diameter of drivers, 57 in.; straight boiler, with a working steam pressure of 200 lbs.; tank capacity, 7,000 gallons of water, and coal capacity, 14 tons. The special equipment for all includes: Westinghouse air-brakes, magnesia boiler lagging, Chicago brake-beams, American brake-shoes, Climax couplers, Handlan-Buck headlights, Ohio injectors, Magnus journal bearings, Sullivan piston and valve rod packings, Crosby safety valves and steam gages, Economy sanding devices, Chicago bull's-eye sight-feed lubricators, Railway Steel Spring Co.'s springs, Paige truck wheel tires and Davis cast-steel wheel centers.

#### CAR BUILDING.

*The Atchison, Topeka & Santa Fe* has ordered 30 smoking cars.

*The Iowa Central*, it is rumored, is in the market for about 500 coal cars.

*The Atlanta & Birmingham*, it is reported, is in the market for nine passenger cars.

*The Bessemer & Lake Erie*, it is reported, is in the market for passenger equipment.

*The Buffalo & Susquehanna*, it is reported, is in the market for freight equipment.

*The Missouri Pacific*, it is reported, is figuring on 3,000 to 5,000 additional freight cars.

*The Denver, Northwestern & Pacific* has ordered eight passenger cars from the Pullman Co.

*The Mexican Central* has ordered 70 Rodger ballast cars from the Rodger Ballast Car Co.

*The Norfolk & Western* has ordered 1,000 box cars from the American Car & Foundry Co.

*The Minneapolis, St. Paul & Sault Ste. Marie*, it is reported, is in the market for passenger cars.

*The Lake Shore & Michigan Southern*, it is reported, will shortly order upward of 1,000 furniture cars.

*The Shippers Refrigerating Car Company*, Chicago, is preparing specifications for additional equipment.

*The Atchison, Topeka & Santa Fe* has ordered 1,000 box cars from the American Car & Foundry Co.

*The New York Central & Hudson River* has ordered 1,000 box cars from the American Car & Foundry Co.

*The Mather Horse & Stock Car Company*, Chicago, has ordered 680 stock cars from the American Car & Foundry Co.

*The Elgin, Joliet & Eastern* has ordered 500 gondola cars of 100,000 lbs. capacity from the Western Steel Car & Foundry Co.

*The Atlantic & Birmingham* has ordered 1,350 box and flat cars of 60,000 lbs. capacity from the South Atlantic Car & Manufacturing Co.

*The Delaware, Lackawanna & Western* is figuring on 1,000 steel hopper coal cars and 700 steel gondola coal cars of 80,000 lbs. capacity.

*The Ferrocarril Central Norte de Argentina* has ordered 80 box cars, 40 gondola cars and 20 stock cars from the Middletown Car Works.

*The Pittsburg & Lake Erie* has ordered 1,000 coal cars from the Pressed Steel Car Co. and 2,200 freight cars from the American Car & Foundry Co.

*The San Rafael & Atlixco* has just ordered 50 freight cars and four passenger cars from the Mexican Car & Foundry Co. Delivery of these cars is to be made in 90 days.

*The New York Central & Hudson River* is asking bids on a large number of passenger cars and has ordered 125 steel motor cars. The bodies will be made by the American Car & Foundry Co. and the trucks will be made by the American Locomotive Co.

*The Lehigh Valley*, as reported in our issue of October 20, has ordered 3,000 freight cars as follows: One thousand gondola cars of 100,000 lbs. capacity and 1,500 box cars of 80,000 lbs. capacity from the Standard Steel Car Co., and 500 box cars from the American Car & Foundry Co.

*The Chicago, Milwaukee & St. Paul* will build six flat cars of 100,000 lbs. capacity at its West Milwaukee shops. These cars will be 50 ft. long x 9 ft. 2 3/4 in. wide x 4 ft. 3 3/4 in. high. The special equipment includes: Congdon brake-shoes, Hennessy double friction draft rigging and Barber trucks.

*The Boston & Maine* has ordered 20 passenger cars from the Pullman Company for 1906 delivery. These cars will have a seating capacity of 72 persons each, and will be lighted by the Pintsch mantle lights. It has also ordered 1,000 drop and gondola cars of 60,000 lbs. capacity from the Laconia Car Company.

*The Clarendon & Pittsford* has ordered 15 flat cars of 80,000 lbs. capacity from the Middletown Car Works for January, 1906, delivery, instead of 20, as reported in our issue of November 10. These cars will be 30 ft. long by 8 ft. 9 in. wide. The special equipment includes Tower couplers and Miner tandem draft rigging.

*The Rodger ballast cars and the Hart convertible cars* reported in our last issue ordered by the Mexican Central, the Lake Shore & Michigan Southern, and the Chicago, Burlington & Quincy, are to be built by the American Car & Foundry Co., but were ordered from the Rodger Ballast Car Co., Chicago, and not from the American Car & Foundry Co. as reported.

*The Central of New Jersey*, as reported in our issue of November 10, has ordered 50 stock cars from the Middletown Car Works for 1906 delivery. These cars will have a capacity of 60,000 lbs., and will be 36 ft. over all, 8 ft. 1 1/2 in. wide x 8 ft. 3 in. high inside. The bodies and underframes will be of wood. The special equipment includes: Westinghouse quick action brakes, Tower all-steel couplers and Miner draft rigging.

*The Cincinnati, New Orleans & Texas Pacific*, as reported in our issue of November 10, has ordered 250 flat cars from the American Car & Foundry Co. These cars will have a capacity of 40 tons and will be 40 ft. long x 8 ft. 10 in. wide over all. The body and underframes will be of wood. The special equipment includes: Open hearth steel axles, American Steel Foundries' bolsters, Buffalo brake-beams, cast-iron brake-shoes, Westinghouse air-brakes, Ajax brasses, Climax couplers, Miner draft rigging, Harrison dust guards,



Symington journal boxes, Railway Steel Spring Co.'s springs, Archbar trucks and 33-in. cast-iron M. C. B. wheels.

*The Boston & Maine*, as reported in our issue of November 3, has ordered 1,000 drop-end gondola cars from the Laconia Car Co. for May, 1906, delivery. These cars will have a capacity of 60,000 lbs. and will weigh 26,000 lbs. They will be 34 ft. long x 8 ft. 1 in. wide x 3 ft. high inside measurements. The bodies and underframes will be of wood. The special equipment includes: Wrought-iron axles, Pressed steel bolsters, Simplex brake-beams, cast-iron brake-shoes, Westinghouse air-brakes, lead-lined brasses, Gould couplers, Miner tandem draft rigging, cast-iron journal boxes and Wood dust guards, Crucible steel springs, pressed steel trucks and cast-iron car wheels.

*The Brooklyn Rapid Transit System*, Brooklyn, N. Y., as reported in our issue of September 29, has ordered 100 semi-convertible surface passenger cars from the John Stephenson Co., and 50 semi-convertible surface passenger cars from the Laconia Car Co. All cars will weigh completely equipped 47,000 lbs., and measure 42 ft. 6 in. long, 8 ft. 2½ in. wide, and 11 ft. 11 in. high, over all. The special equipment includes: Lappin brake-shoes, Westinghouse air-brakes, Streeter brasses, Curtain Supply Co.'s curtain fixtures, Pantasote curtain material, J. L. Howard & Co.'s door fastenings, Consolidated Car Heating Co.'s heating system, Heywood Bros. and Wakefield seats, Baldwin trucks, John Stephenson Co.'s vestibules and Schoen rolled steel wheels.

*The Delaware, Lackawanna & Western*, as reported in our issue of November 10, has ordered 500 box cars of 60,000 lbs. capacity from the American Car & Foundry Co., and 500 box cars of 60,000 lbs. capacity from Barney & Smith, all for February, March and April, 1906, delivery. All cars will weigh about 34,000 lbs., and measure 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, inside measurements. The special equipment includes: Simplex bolsters, Pennsylvania Brake-Beam Co.'s brake-beams, American Brake-Shoe & Foundry Co.'s brake-shoes, Westinghouse air-brakes, Magnus Metal Co.'s brasses, Smith door fastenings, Miner tandem draft rigging, Woodman journal boxes, Sherwin-Williams Co.'s paint, Murphy inside roofs, Simplex Railway Appliance Co.'s springs, and Barber roller-bearing trucks.

*The Chicago & North-Western* has ordered 25 non-vestibule coaches, five vestibule coaches and 10 baggage cars from the Pullman Co., for February, March and April, 1906, delivery. The coaches will be 55 ft. 6½ in. long, over sills, 9 ft. 8 in. wide and 6 ft. 8½ in. high, inside measurements. The baggage cars will be 63 ft. 2 in. long, 10 ft. 2¼ in. wide and 14 ft. 9½ in. high, over all. The special equipment for all includes: National-Hollow brake-beams, Christie brake-shoes, Westinghouse air-brakes, Chicago couplers, Chicago & North-Western standard draft rigging, Chicago & North-Western standard heating system for vestibule coaches and baggage cars, Chicago & North-Western standard paint for baggage cars, Chicago & North-Western standard platforms for vestibule coaches and baggage cars, Chicago & North-Western standard roofs for baggage cars, Chicago & North-Western standard trucks for non-vestibule coaches and steel-tired wheels.

#### BRIDGE BUILDING.

ARNPRIOR, ONT.—The Renfrew County Council will rebuild the Clay Bank bridge over the Madawaska river about three miles from this place.

BRADDOCK, PA.—A contract has been given by the Pittsburg & Lake Erie to the Dravo Construction Co. for building a new bridge over Turtle creek.

CARTHAGE, MO.—Bids are wanted Nov. 30 by William Kohlman, County Surveyor, for building two steel bridges in Jasper County.

CLEVELAND, OHIO.—The county has notified the city officials that it is ready to pay its share of the cost, between \$50,000 and \$60,000, for building a new bridge near Washington Park at the junction of Fleet and Independent streets. Bids will soon be asked for the work.

DANVILLE, ILL.—The Cleveland, Cincinnati, Chicago & St. Louis is building a large concrete bridge here.

EDMONTON, N. W. T.—The Provincial Government will take steps for the construction of a traffic bridge across the river at Kipp.

FLORENCEVILLE, N. B.—The bridge across the St. John river at this place will be rebuilt.

FREDERICTON, N. B.—C. H. LaBillois, Commissioner of Public Works, is receiving bids for rebuilding Wallace Mill bridge in Restigouche county. It is probable that extensive repairs will be made to the International bridge, between St. Stephen and Calais.

LETHBRIDGE, ALBERTA.—The Canadian Pacific, it is said, is making surveys to locate the site for its proposed bridge to be built over the river here. The bridge will have to be over a mile long.

MANITOWOC, WIS.—The City Council has authorized the asking of bids for putting up a bascule bridge at Main street. The plans which are being made for the proposed structure call for a bridge with an 80-ft. opening and 22-ft. roadway, with a 6-ft. walk.

OMAHA, NEB.—The Chicago, Burlington & Quincy is planning to build three steel bridges on its proposed line through the Big Horn basin in Wyoming.

OWENSBORO, KY.—Residents are agitating the question of building a combined highway and railroad bridge over the Ohio river here.

SOUTH BEND, IND.—The Board of County Commissioners has given a contract to the Lafayette Engineering Co. for removing the old Jefferson street bridge from its present site and building the substructure for the bridge which is to be relocated near Springbrook Park at their bid of \$18,924. The commissioners also awarded a number of contracts for small bridges.

TORONTO, ONT.—The Canadian Pacific, the Grand Trunk and the city of Toronto will each pay one-third of the cost of building a steel combined highway and railroad bridge at Yonge street to cost \$200,000.

The Ontario Government will ask for call bids for some bridges to be built in northern Ontario. Particulars from the Minister of Public Works.

#### Other Structures.

ALBANY, GA.—The Atlantic Coast Line station recently destroyed by fire at a loss of about \$20,000 will at once be rebuilt.

CINCINNATI, OHIO.—The Chesapeake & Ohio has approved the plans for its proposed freight terminal to be built on West Third street at a cost of \$500,000.

DANVILLE, ILL.—The Cleveland, Cincinnati, Chicago & St. Louis has bought a large plot of ground to be used as a site for new shops for the two divisions entering this city. The cost will be about \$150,000.

DEMOPOLIS, ALA.—The Southern, it is said, will put up a new freight house; also a new passenger station.

HAVRE DE GRACE, MD.—The Pennsylvania has received bids for building a two-story brick passenger station 70 ft. x 26 ft.; also a waiting room 23 ft. x 16 ft., and for shelter sheds 140 ft. long.

HORTON, KAN.—The Chicago, Rock Island & Pacific will build a new roundhouse to cost about \$75,000.

LETHBRIDGE, B. C.—The Canadian Pacific and the Alberta Railway have jointly let a contract to Smith Bros. & Wilson for putting up a union passenger station here.

LINCOLN PARK, N. Y.—The Buffalo, Rochester & Pittsburg, it is said, will put up a new brick shop 140 ft. x 180 ft.

MILWAUKEE, WIS.—The Chicago, Milwaukee & St. Paul is improving ten of its warehouses on the river front at a cost of \$60,000.

NEW WESTMINSTER, B. C.—The Vancouver, New Westminster & Yukon, it is said, will at once build wharves and freight sheds and make other water front improvements in this city.

NORTON, KAN.—A contract has been given by the Chicago, Rock Island & Pacific to C. A. Feltons, of Topeka, Kan., for building a 27-stall roundhouse here to cost \$75,000.

PARSONS, KAN.—The Missouri, Kansas & Texas, it is said, will soon ask bids for putting up some of the larger buildings at its new locomotive works to be built here. The total cost of the improvements will be \$1,000,000.

PITTSBURG, PA.—The Wabash Pittsburg Terminal, it is said, has plans ready for building large warehouses near its tracks, and bids are to be received shortly for the work.

SAN MARCOS, TEX.—An officer writes that the International & Great Northern will put up a combination brick and wood passenger station one story high, 69 ft. x 191 ft., to cost \$12,000. Work is to be commenced at once.

WOONSOCKET, R. I.—The Providence & Burrillville Street Railway Co. has given a contract to the Builders' Concrete Stone Co., of Pawtucket, for building new car barns here. The plans call for a structure 55 ft. x 110 ft., with two additions, one of 60 ft. x 130 ft., for offices and shops, and one of 20 ft. x 13 ft.

#### RAILROAD CONSTRUCTION.

##### New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—Application has been made by this company to the courts of Muskogee, Ind. T., to appoint an appraising board to condemn a right of way from that point to Shawnee, Okla. T., a distance of 120 miles. The proposed line will con-

nect the branch between Independence, Kan., and Tulsa and the Oklahoma lines at Shawnee.

See Gulf, Colorado & Santa Fe below.

**ATLANTIC & CAROLINA (ELECTRIC).**—This company, which was chartered in April of last year to build an electric railroad from Atlanta, Ga., to Anderson, S. C., a distance of about 125 miles, has amended its charter so as to change its proposed route from Atlanta to Rockdale County through the town of Lithonia, in Dekalb County, to Colliers, in Rockdale County. (See Construction Record.)

**BALTIMORE BELT LINE TERMINAL (P., B. & W.).**—An officer writes respecting the proposed belt line to be built by this company around Baltimore, Md., that it has not as yet been finally decided whether the line will be built partly through the city or further out. (November 3, p. 142.)

**CANADIAN PACIFIC.**—This company has opened the Lacombe branch of the Western division from Lacombe, Alberta, to Alix, 26.6 miles. The Wetaskiwin branch of the Western division has been opened for business from Wetaskiwin, Alberta, to Camrose, 25 miles, and the Pheasant Hills branch of the Central division has been extended from Lipton, Assiniboia, west to Strassburg, 54 miles. This branch will be extended to Saskatoon and eventually to a connection with the Wetaskiwin branch.

**CHICAGO, ROCK ISLAND & PACIFIC.**—See Rock Island, Arkansas & Louisiana below.

**CUMBERLAND RIVER & NASHVILLE.**—This company has filed a mortgage in Kentucky for \$2,500,000 to build a railroad from Corbin, Ky., southwest down the Big Laurel river, through Laurel, Whitley, Pulaski, Wayne and Clinton Counties in Kentucky, to Nashville, Tenn., a total distance of about 200 miles. The road will pass through a rich coal and timber territory. L. F. Hubble, of Somerset, Ky., is a director. A contract is said to have been let for building the first 20 miles of the new line from a point on the Cincinnati, New Orleans & Texas Pacific south of Burnside to Monticello, the county seat of Wayne County, and work is to be commenced shortly.

**DARIEN & WESTERN.**—This company, which operates a line from tidewater at Darien, Ga., northwest to Weefannie, 46 miles, is building an extension from that point northwest to Glenville, where connection will be made with the new Reidsville & Southeastern, controlled by this company, from that point north to Collins, in Tattnall County, a distance of 23 miles. Part of the Reidsville & Southeastern from Reidsville north for a distance of seven miles to Collins was formerly the Collins & Reidsville Railroad.

**DEEPWATER.**—See Tidewater below.

**DULUTH, VIRGINIA & RAINY LAKE.**—President W. H. Cook announces that this road, 46 miles long in St. Louis County, Minn., will be extended from Pelican Lake, the present terminus, northwest to Fort Frances, Ont., about 50 miles.

**GEORGIA NORTHERN.**—This company has discontinued the use of its line from Oaklawn, Ga., south, six miles, to Pidcock, which was formerly the southern terminus of the road, and has opened a new line from Oaklawn southwest to Boston, in Thomas County, Ga., six miles, where connection will be made with the Atlantic Coast Line.

**GRAND TRUNK PACIFIC.**—This company is negotiating with the Canadian Northern for the double tracking of the C. N. line from Winnipeg west to Portage la Prairie, a distance of 59 miles, over which the Grand Trunk Pacific wishes to secure trackage rights. Unless an agreement is reached the G. T. P. will shortly commence the construction of this link of its line, making three lines between Winnipeg and Portage la Prairie. F. W. Morse, General Manager of the G. T. P., has announced that as soon as the main line is built far enough branches will be built to Regina, Prince Albert, Battleford and Calgary, and probably to Yorkton. It is the intention to have some of these western lines in a position to carry some of next year's wheat.

**GREAT NORTHERN.**—The extension of this company's line into British Columbia, has reached Keremeos, and the company's engineers say that the line will be at Princeton by the first of the year.

**GREAT NORTHERN OF CANADA.**—This company has opened a new branch to be known as the St. Jacques branch from St. Jacques Junction, Que., on the main line, southeast to St. Jacques, a distance of seven miles.

**GULF, COLORADO & SANTA FE (A., T. & S. F.).**—An officer writes regarding the report that this company would build a line from Davis, in the Chickasaw Nation, Ind. T., east to the coal fields, that the citizens of Sulphur, which is about eight miles east of Davis, have made a proposition to the company to build a branch from that point and that the company has made preliminary surveys for the line. (September 29, p. 103.)

**HUDSON & MANHATTAN (ELECTRIC).**—This company, incorporated to build a tunnel between Manhattan (Cortlandt street) and

Jersey City (Montgomery street) has filed a revised certificate submitting surveys for a route from Jersey City to Newark. The purpose is said to be to provide a fast passenger line from Newark to New York, and the Pennsylvania Railroad is said to be friendly to the scheme. From the Jersey City terminus of the Pennsylvania Railroad, which is the western terminus of the river tunnel, the new route is by a subway west to Brunswick street; thence on the surface to a point in Harrison (about six miles), at which place it will again run underground and beneath the Passaic river, then continuing in a subway to a terminus in Market street, Newark. The certificate was signed by W. G. McAdoo as President of the company. (June 23, p. 207.)

**ILLINOIS CENTRAL.**—See Yazoo & Mississippi Valley below.

**LAKE SUPERIOR & SOUTHEASTERN (WIS. CENT.).**—A contract has been given by this company to H. F. Balch, of Minneapolis, Minn., for grading 112 miles of its road from Duluth to Ladysmith, Wis. Part of this road, from Owen to Ladysmith, to be known as the Owen & Northern, is to be put in operation by the first of January. Grading work has been going on by McIntosh Bros., of Milwaukee, who have the contract, for the past six months. These two roads will form the extension of the Wisconsin Central to Duluth. (September 1, p. 72.)

**LANCASTER, OXFORD & SOUTHERN.**—This company, which operates 20 miles of road from Oxford, in Chester County, Pa., west to Susquehanna, has opened its new extension from Fairmount north to Quarryville, Lancaster County, 7 miles, where connection will be made with the Pennsylvania.

**LAS VEGAS & TONOPAH.**—An officer writes that this proposed road is to be built from Las Vegas, Nev., to Tonopah, a distance of 215 miles. There are no towns of importance on the route at present, except Bullfrog, Rhyolite and Beatty, about 115 miles from Las Vegas. The next town of importance is Goldfield, about 80 miles beyond Bullfrog. The line has been surveyed as far as Bullfrog and construction will commence early next month. Part of the grading is already completed, but no track has yet been laid. The company will do the track laying and grading, which will not be difficult, and will build its own bridges. The maximum grade westbound between Las Vegas and Bullfrog will be 1 per cent., eastbound 1.5 per cent., and the balance of the line 1 per cent. J. Ross Clark is President, and Arthur Maguire, Chief Engineer, Los Angeles, Cal. (November 3, p. 143.)

**MANISTIQUE.**—This road has been extended from Diller, Mich., its southern terminus, to Curtis, a distance of six miles.

**MIDLAND & MANITOBA.**—The first contract for grading this proposed road has been let to John Prout, of Portage la Prairie. Work will be rushed with a view to putting on trains early next spring. (November 3, p. 143.)

**MILWAUKEE NORTHERN (ELECTRIC).**—Incorporation has been granted to a company under this name in Wisconsin, with a capital of \$100,000, to build an electric railroad from Sheboygan, Wis., south for a distance of about 60 miles to Milwaukee, passing through Fond du Lac, Port Washington and other points. John E. Uselding, of Port Washington; Peter D. Brueckbauer, of Elkhart, and John M. Saeman, of Sheboygan, are incorporators. Such a line would parallel the Chicago & North-Western between these two points.

**NASHVILLE & HUNTSVILLE (ELECTRIC).**—This company, which proposes to build a line from Memphis, Tenn., through Nashville, Tenn., and Birmingham and Montgomery, Ala., to Pensacola, Fla., announces that it will soon begin grading work on the first division, north of Nashville, and on the second division, south of Huntsville. J. H. Conner is President. (See Construction Record.)

**OREGON & IDAHO.**—A company has been incorporated in Idaho under this name to build a railroad from Emmett, Idaho, northwest through Payette Valley to Ontario, Ore., a distance of about 30 miles. The incorporators include: Nathan C. Richards and O. C. Wright, both of Sumpter, Ore.

**OREGON WESTERN (SO. PAC.).**—Surveys are being made by the Southern Pacific for building this proposed road from Drain, Ore., west along Elk creek and the Upqua river to the Pacific coast at Gardiner, thence south to the head of Coos bay and around that water to Marshfield, a total distance of about 80 miles. The cost of the work will be approximately \$3,500,000. (See Southern Pacific, August 25, p. 63.)

**PENNSYLVANIA.**—A contract is reported let to Menamin & Sims, of Philadelphia, at about \$150,000 for double tracking on the Petersburg branch of this road from Coverdale to a point west to Clover Creek Junction, a distance of 2½ miles. A contract is also reported let to the Millard & McGraw Construction Co., of Philadelphia, for double track work from Clover Creek Junction to Franklin Forge, an additional 2½ miles. The contracts call for the beginning of the work at once and completion by May 1, 1906.

PHILADELPHIA, BALTIMORE & WASHINGTON (PENNA.).—See Baltimore Belt Line Terminal above.

PUEBLO, OKLAHOMA CITY & NEW ORLEANS.—Incorporation has been granted this company in Oklahoma with a capital of \$30,000,000 to build a railroad from Pueblo, Colo., southeast to New Orleans, 1,035 miles, air line. Preliminary surveys will be made and it is hoped to have financial arrangements completed by the first of next year. The initial work will be started between Oklahoma City and Woodward. The incorporators include: J. H. Wheeler, W. C. Burke, R. A. Wooldridge, George H. Dodson and J. H. Wright, all of Oklahoma City.

RIO GRANDE WESTERN.—This company has track laid on its extension from Bingham, Utah, north to the mills of the Utah Copper Co., a distance of 13 miles. The road will be extended two miles further to Garfield.

ROCK ISLAND, ARKANSAS & LOUISIANA (C., R. I. & P.).—Certificates authorizing the consolidation of the Arkansas Southern with the Little Rock & Southern and the Arkansas Southern Extension Railroad Company under the above name have been filed in Arkansas. The capital stock of the consolidated company is \$15,000,000, and headquarters will be at Little Rock. The directors include: E. P. Peirce, H. W. Morrison, W. S. Tinsman, T. S. Buzbee, of Little Rock, and A. E. Sweet, of Ruston, La. The company will operate the following lines of railroad: From Crossett to some point on or near the Mississippi river in Louisiana; from a point upon the Haskell-Eldorado line to Malvern, Ark.; from Haskell, Ark., to Little Rock; from a point at or near Junction City, La., to Shreveport, La.; from a point at or near the southern boundary of Winn Parish, Louisiana, to Alexandria, La.; from Alexandria southward to the Gulf of Mexico; from Alexandria westward or southwestward to the western boundary of Louisiana, and from Alexandria, La., to a point upon the Mississippi river at or near the city of Baton Rouge, La., or the city of New Orleans or upon the Mississippi river between Baton Rouge and New Orleans.

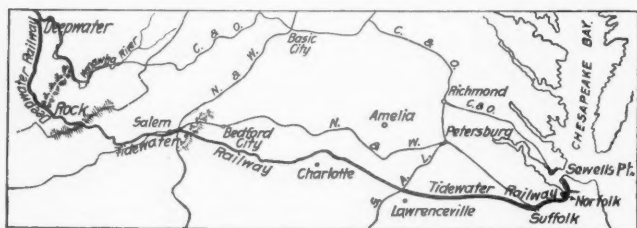
ST. LOUIS SOUTHWESTERN.—An officer writes respecting the proposed extension of this road from its southern terminus at Gatesville to Hamilton, Tex., that surveys were made some time ago for a distance of 33 miles, but that no definite action has as yet been taken towards beginning the work.

SHREVEPORT & NORTHEASTERN.—An officer writes that this proposed road is to be built from Shreveport, La., via Homer to Memphis, Tenn. Surveys have been completed from Shreveport to Homer and nearly all the right of way secured. A contract has been let for building eight miles from Minden, La., southwest and in the 10 miles southwest from Homer, several miles of grading is nearing completion. Track laying will follow immediately and grading of the intervening section between Homer and Minden will be carried on during the winter. A. K. Clugman is President, Shreveport, La. (October 27, p. 139.)

SOUTHERN PACIFIC.—An officer writes that the Shattuck & Desmond Construction Co., of Los Angeles, is grading between Santa Cruz and Davenport, 12 miles, on the proposed extension from Santa Cruz, Cal., north via Davenport, San Gregoria, Pescadero and Half Moon Bay to a junction with the Southern Pacific near Colma approximately 68 miles. (October 27, p. 135.)

See Oregon Western above.

TIDEWATER.—An officer writes that this road is now building its line from Tidewater at Sewell's Point, near Norfolk, Va., westerly to the crossing of the Seaboard Air Line near Lawrence-



Tidewater and Deepwater Railways.

ville, 103 miles, and that bids are in for grading the balance of the line from this point west to Rock, W. Va., 259 miles, where connection will be made with the Deepwater Railroad. The latter is building 84 miles of railroad from that point north to Deepwater, on the Chesapeake & Ohio; and 24 miles of the line from Lively north to Deepwater has been completed.

WISCONSIN CENTRAL.—See Lake Superior & Southeastern above.

YAZOO & MISSISSIPPI VALLEY (ILL. CENT.).—This company, it is reported, has begun track laying on its new branch from Webb, Miss., east to Parchman, a distance of eight miles.

## RAILROAD CORPORATION NEWS.

ALLEGHENY VALLEY.—See Pennsylvania below.

BOSTON & MAINE.—The results of operation during the three months ending September 30 are as follows (cents omitted):

	1905.	1904.
Gross earnings .....	\$10,449,587	\$9,908,851
Operating expenses .....	7,165,666	6,715,993
Net earnings .....	\$3,283,921	\$3,192,858
Net income .....	3,401,471	3,294,861
Surplus .....	1,362,632	1,262,192

CANADIAN NORTHERN.—This company operated 1,876 miles of road during the year ending June 30, 1905, an increase of 290 over the previous year. There was an increase of about 250,000 tons in freight carried and 125,000 in the number of passengers. Statistics of operation for the year are:

	1905.	1904.
Gross earnings:		
Passenger .....	\$663,936	\$516,808
Freight .....	3,061,531	2,412,384
Mail, express, etc. ....	464,745	313,511
Total .....	\$4,190,212	\$3,242,703
Operating expenses:		
Maintenance of way .....	\$557,261	\$476,930
Maintenance of equipment ..	410,707	296,355
Conducting transportation ..	1,515,300	1,174,932
General .....	161,462	172,575
Total .....	\$2,644,730	\$2,120,772

CHICAGO & EASTERN ILLINOIS.—The New York Stock Exchange has listed \$5,000,000 4 per cent. refunding and improvement mortgage bonds of 1955. (October 6, p. 112.)

LAKE SHORE & MICHIGAN SOUTHERN.—The report for the quarter ended September 30 shows the following results:

	1905.	1904.
Gross earnings .....	\$10,069,253	\$8,776,979
Operating expenses .....	8,255,647	6,292,832
Net earnings .....	\$1,813,606	\$2,484,146
Surplus .....	1,053,606	1,434,146

NEW YORK CENTRAL & HUDSON RIVER.—It is reported as we go to press that at a meeting of the board of directors, to be held this week, an issue of \$17,500,000 new stock will be offered at par to the shareholders. There is now \$132,250,000 capital stock outstanding—\$150,000,000 authorized.

NEW YORK, NEW HAVEN & HARTFORD.—The report of this company for the quarter ended September 30 reflects the generally prosperous condition of the manufacturing towns of New England. The results of operation during this period are as follows:

	1905.	1904.
Gross earnings .....	\$13,849,515	\$12,989,029
Operating expenses .....	8,993,930	8,721,795
Net earnings .....	\$4,855,585	\$4,267,234
Surplus .....	2,611,102	2,293,285

PENNSYLVANIA.—This company proposes to exchange 1½ shares of its stock for two shares of Allegheny Valley preferred stock if 90 per cent. of the holders of the latter stock sign an agreement to that effect before December 1. The Pennsylvania now owns a majority of the stock of the Allegheny Valley, which consists of 263 miles of line between Pittsburg and Oil City, Pa., and Redbank, Pa., and Driftwood, and is operated as a part of the Buffalo & Allegheny Valley division of the Pennsylvania. There is \$10,544,200 common stock of the Allegheny Valley outstanding; the Pennsylvania owns \$9,653,800 of this and \$11,876,655 of the \$17,174,998 preferred stock. Thus, if an agreement is reached and the exchange is made, the Pennsylvania will turn about \$6,000,000 of its own stock into its own treasury in exchange for the Allegheny Valley stock which it holds, and the minority Allegheny Valley stockholders will get a dividend paying stock in place of the securities which they now hold on which no dividends have ever been paid.

The New York Stock Exchange has listed \$100,000,000 3½ per cent. ten-year convertible bonds of the Pennsylvania. (October 6, p. 112.)

QUEBEC SOUTHERN.—The Exchequer Court at Montreal has announced the acceptance of the bid of \$1,051,000 made by the bank of St. Hyacinthe for the Quebec Southern. The decision was appealed. The Quebec Southern owns 89 miles of road between Sorel, Que., and Noyan, and 55 miles of road between St. Lambert and St. Francois, which was formerly the South Shore and which was consolidated with the Quebec Southern in 1902. The road went into the hands of a receiver in 1904.

TENNESSEE CENTRAL.—There is to be no further change, for the present, in the direct management of this company. After December 1 it will be operated under the joint direction of the Illinois Central and the Southern, who will, however, make no changes in any of the official positions. A meeting of the shareholders has been called for January 10, to act on a proposed sale of the entire property to the Illinois Central and the Southern. (October 27, p. 136; November 10, p. 147.)



